BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVI 1904. No. 4

MARTIN WALDSEEMÜLLER AND THE EARLY LUSITANO-GERMANIC CARTOGRAPHY OF THE NEW WORLD.

AN ADDRESS*

BY

E. L. STEVENSON.

Twenty-five years ago the honoured President of this Society chose as the theme for his annual address, "What we know of maps and map-making before the time of Mercator," giving in brief sketch a review of the progress of cartographical science through a period of 2,000 years. He said:

> I have sought to bring together and arrange in something like connected order the principal facts in the history of cartography down to the time of Mercator. I have attempted to do this because, as far as I know, the facts have never been brought together as a whole.

This was the *raison d'être* of that admirable address.

In reading its pages, particularly those reviewing the earliest cartography of the New World, I have noted, however, statements here and there quite correct, in the main, according to the knowledge of the time, but which the investigations of the years since then have shown to be inaccurate. It is there stated that "the first map on which the discovery of Columbus appears is that of John Ruysch;" that "The Stobnicza Map is the first to present the spherical surface of the earth upon a plane;" that the "Apianus Map has acquired a celebrity as the first map on which the name AMERICA appears." Although this paper made no pretence to an exhaustive treatment of the subject, I could but think, on reading it, how fruitful have been the last twenty-five years in this field of

* The address was illustrated.

study; how much that had been written then needs correction now; how much, indeed, that was written ten years or less ago needs revision; how much there is yet to be done before we are brought to realize fully the value of these documents.

Great, I know, would have been the interest of Judge Daly in each new discovery, and quick he would have been to catch its scientific import, alert to correct the record of yesterday by the newly-acquired information of to-day.

In this day, when a new interest seems to be awakened in the earliest cartography of the New World, occasioned by a fuller appreciation of the historical value of early maps, and by recent discoveries, to which so much importance clearly attaches, it has occurred to me that a review of that cartography in the light of present knowledge would appeal to this Society as a theme well worth an evening's consideration.

My purpose, therefore, in this address is to trace the development of the New World cartography from its earliest beginnings until fairly accurate notions were entertained concerning the Western Hemisphere, with a brief reference to some pre-Columbian maps; to call attention to some of the problems which have arisen concerning this cartography, and to the solutions which more recent investigations have advanced for a number of these problems, and to consider especially the influence of Martin Waldseemüller and the St. Dié School.

Of the maps to be exhibited not a few are comparatively well known, and their significance fully understood. Some of the more important ones, however, are little known, having been discovered recently, among which may be named the CANERIO, the GLAREANUS, the KING, and the WALDSEEMÜLLER.

I wish here to speak a word of commendation for such investigators as Harrisse, Nordenskiöld, and Kretschmer, for their critical and systematic work in this field in the last twenty-five years, and for their efforts, though wanting completeness, to make many of these early maps accessible in facsimile reproductions, and for the encouragement they have given the desire for a more intimate acquaintance with these valuable historical documents. It is a surprising fact that very little has been done in our own country to encourage a systematic and critical study of old maps, very little to make them accessible to students. A few of the better-known printed maps of the day of discovery and exploration have reappeared in works treating the subject of early American history, and their importance has been noted; but in many of these reproductions found in

American books it is only a small section of the map that has been reproduced, and so imperfectly has the work often been done as to render it of little value. There are many manuscript maps preserved in European libraries of the highest value for the history of discovery in America which are little known, which never have been critically examined, and never have been reproduced even in part. Here is a field which American scholarship should enter, here is opportunity for a monumental publication—may I say for a monumental atlas?—of cartographical documents relating to a most interesting and important period.

No activity of the period which we designate the Renaissance was more fruitful of important results than that having to do with maritime discovery and exploration. Just how early navigators, urged on by practical interests, began to feel their way down the coast of Africa, or to sail the Atlantic in search of those islands which had an existence in the literature of tradition, and to penetrate the region of the north, we do not know. We, however, find the fact clearly established that by the opening of the fifteenth century there was a lively interest, particularly among the peoples of the Mediterranean lands, in such enterprises as were undertaken for the purpose of opening up communication with remote regions of the earth. Here we meet with a veritable renaissance of geography. Our oldest maps of real value, which seem to owe their origin to these newly-awakened interests, are the portolanos or coast charts, constructed at first for the region of the Mediterranean. These portolanos were the work of the sea-faring peoples of Italy and the coast districts of the western Mediterranean, who were the immediate precursors of the trans-Atlantic explorers, and they possess a real value, in striking contrast with the world-maps of the Middle Ages—an individuality which insured them for many years a place of commanding importance. They form the basis of many of the maps in which the New World is first presented.

When Chrysoloras and Aurispa, with their companions among the early Humanists, were introducing into Italy the re-discovered literature of Ancient Greece, along with their treasures came the text of Ptolemy's Geography. "It had the effect of an important discovery, which seized men's minds, at first with even more force than the discovery of the New World by Columbus. Not a new world, but the very world in which one was living, had been extricated from the darkness in which it had been hidden during a whole millennium."

Ptolemy became anew the teacher of geography to the peoples

of Europe, and his authority was very tardily called in question even after the discovery of the New World. Long after the region had been explored lying beyond the world of which Ptolemy had knowledge, the work of that Alexandrian geographer was in great favour. "No less than thirty editions of his work were printed before 1570, and of these twenty-six contain about 700 old Ptolemy maps and about 400 tabulæ novæ." If a comparison is made with the small number of maps which were printed before the year 1570, some impression of the influence of the Alexandrian geographer, after fourteen hundred years had passed, may be gained. A study of modern cartography should begin with Ptolemy—the Ptolemy of the Renaissance.

The oldest known copy of his work, to which in addition to the usual 27 maps new maps have been added, is found in the library of Nancy, France. Considering Greenland to be a part of the western continent, we find here one of the oldest known maps in which any part of the New World appears. It is stated in the accompanying text that it is the work of Claudius Clavus, and it is probably based upon the observations of northern explorers. Though a sketch far from accurate in its details, it has the merit of exhibiting accurately the relative position of Iceland and Greenland, that which is not true generally of the maps of Columbus's day. To the significance of this fact Professor Fischer, the fortunate discoverer of the long-lost Waldseemüller world-map of 1507, in his excellent critical study of the discoveries of the Northmen in America, has recently directed attention. It is probable that to inaccurate description and to the confusion of names such errors as the placing of Iceland west or south of Greenland are due. In the majority of the maps of Donnus Nicolaus Germanus, that cartographer, to whom we owe so much for his skill in the reproduction of the Ptolemy maps, the above-mentioned error is perpetuated. It was unquestionably from this cartographer that Waldseemüller drew his information concerning the northern regions which he reproduces in his map of 1507. Aside from the features referred to as appearing in the early editions of the Ptolemy geography, the general influence of this work in encouraging maritime enterprises which ultimately led to the discovery of America is an all-important fact.

Not, however, until 1504 does there appear a Ptolemaic world-map which makes mention of the discoveries of Columbus, for I take it the brief legend appearing in the Reisch map of the Margarita Philosophica of that date has reference to such discoveries. On the indicated land connection between Asia and Africa we read: "Here

there is no land, and only a sea, in which are wonderfully large islands which Ptolemy did not know." We shall later see America emerge in this region on a very important globe but recently discovered.

It is a belief, which has found very general acceptance for many years, that when Columbus was in search of aid for his great maritime enterprise a letter and a map were sent to him by the Italian cosmographer Toscanelli, in which it was clearly set forth that a voyage to India by way of the west was altogether possible. The authenticity of both letter and map, which so long have done service in exhibiting the geographical views of Toscanelli, and which by many have been thought to have served Columbus as sailing directions on his first voyage, has been impeached by the recent critical studies of Vignaud and de la Rosa. They present a strong case against d'Avezac, who believed Toscanelli to have been the "initiator of the discovery of America," through the suggestions in his letter. The map, according to the letter, presented little that had not already appeared on other maps of the century—Antillia, St. Brandans, Cape Verde, the Azores—excepting, perhaps, the cartographical demonstration that India did not lie so far away from the shores of western Europe as was commonly believed.

Respecting the authenticity of the Behaim Globe a like question has never arisen. This globe exhibits features in common with the so-called Toscanelli Map for the Atlantic region. It was in the year 1492—the year in which Columbus sailed on his first voyage—that Martin Behaim, a native of Nuremberg, constructed this globe, one of the oldest of which we have knowledge. It is drawn on parchment, and is pasted on a sphere having a diameter of about 18 inches.

Its legends, in the old German dialect, combining historical and geographical record, are not its least interesting feature. Many of the details Behaim derived from the narrative of Marco Polo, and from the maps of his own and of the preceding century. He lived in Portugal in the years when Columbus was seeking aid for his expedition, and it is altogether probable that he talked over with him the problems of a western voyage. If this globe is so intimately associated with the plans for western exploration as has been made to appear, though exhibiting no part of the western continent, it should find a place in any cartographical history of America.

The map in which maritime exploration, prior to Columbus, is best expressed is that by Henricus Martellus Germanus. It was

drawn in Rome in the year 1492, perhaps from information which had found its way thither from Portugal. It expresses, in particular, the conception of the geography of Africa which was entertained as a result of the Portuguese expeditions in that direction. It seems to indicate that a waterway was open to India. For the student of Portuguese explorations it is a map of special importance, as may be seen in the nomenclature and in the legends.

However numerous may have been the maps drawn by State cartographers, who accompanied all official expeditions to the west, or by the pilots of those expeditions, or by those who participated in clandestine voyages and brought back information which was incorporated in early maps, the oldest one known to us to-day is the chart which was constructed by Juan de la Cosa, a pilot who accompanied Columbus on his second voyage. It bears date 1500, which we find written beneath the vignette of St. Christopher appearing on the western border.

There were many expeditions to the west between the years 1492 and 1500, official and otherwise, and doubtless many maps were drawn to represent the location and the contour of the lands discovered. Not a few records are known which tell of such work having been done. Probably some of these treasures lie hidden away in little-known archives, perhaps many of them were early destroyed because so soon out of date, and therefore considered valueless.

But none of these maps is known. The Juan de la Cosa map, therefore, has the distinction of being the oldest map bearing date on which the discoveries of Columbus are indicated, and of being the only Spanish map known of any considerable importance produced in the first thirty years after Columbus brought back word of his discovery. It, however, is not certain that we have in this map, so highly prized, and indeed so valuable, an original. On the contrary, it appears to be a copy, perhaps a copy of a copy—a statement which holds true of the great majority, if not all of the early manuscript maps.

The maps of that day contained information gathered from many and various sources, and in the transcriptions strange errors appear.

Among the many names to be seen on this La Cosa map not a few are unintelligible, occasioned, it is probable, by a careless reading of an original by the copyist. Such errors are considered to be strong evidence that the map is a copy of an older one.

We cannot learn from it what La Cosa thought of the relation of the west continental land to the region of eastern Asia described

by Marco Polo. The map gives rise to many questions concerning the knowledge of the western region at that day. Had the coast which is indicated been traversed from the Cabot landfall in the north to the region touched by Cabral in the south? Was Cuba then known to be an island? It seems to me to be the most reasonable assumption that La Cosa had actual knowledge from sources which we do not now know, and that we do not have here merely an instance of good guessing.

The map clearly belongs to a transitional period. Rich with its colours of red, and blue, and gold, it is an object of art as well as an instrument to serve a practical purpose. In true mediæval style GOG and MAGOG appear in the region which legend assigned to them. Kings are represented on their thrones, buildings indicate the location of cities. The three wise men appear coming out of the east, led on by the Star of Bethlehem. Pope Alexander's Line of Demarcation is drawn, dividing between Spain and Portugal the regions explored and to be explored. Omitting further reference to descriptive details of the map, it may be said that it embodies the results of the first three voyages of Columbus, the first and second voyages of Vespuccius, the voyages of Diego Cam and Cabral; hence, though largely a Spanish map, it is to some considerable extent of Portuguese origin.

As early as 1500 the expeditions of the Portuguese to the west were attracting attention. In that year Cabral, by good fortune, probably not in accord with a prearranged plan, had touched the east coast of Brazil, and word was immediately carried home that a new region had been discovered, to which it was proposed that the name Terra Sanctæ Crucis, or The Land of the Holy Cross, should be given.

The brothers Gaspar and Miguel Cortereal, between 1500 and 1502, sailed into the region entered by the Cabots but a short time before. They were lost in shipwreck, but the meagre records of those first official Portuguese expeditions to the New World seem especially to have impressed the map-makers of that day, since most of them gave prominence to the Cortereal discoveries in their productions. It was especially the knowledge of these expeditions which, reaching Duke Hercules of Ferrara, awakened in him a desire to receive, in full, details respecting trans-Atlantic voyages. To Cantino, his envoy at the Court of the King of Portugal, he therefore gave instructions that a chart should be obtained which would give him information concerning what, up to that time, had been accomplished in the way of discovery. Cantino forthwith

executed his commission, and after a somewhat eventful history, that map is now preserved in the Royal Estense Library of Modena

It is a world-map in colours, omitting the eastern part of Asia, and having an abrupt termination in the west. Probably its most striking feature is the indication of a continental region lying northwest of Cuba. Several theories have been advanced concerning the significance of that continental land—that it is Cuba, that it is Yucatan, that it is Asia. It is now the generally-accepted opinion that Cantino actually intended to represent a newly-discovered continental region, and that he was in possession of knowledge quite sufficient to warrant this belief. Of his 22 names appearing along the coast, not one is given on the La Cosa map, not one is mentioned by Columbus. It is especially unfortunate that this western section of the map has been cut away. We do not know how far he believed that the indicated land extended to the west, how far to the south. It is altogether probable that it was identical with the Canerio map, indicating before its mutilation an indefinite stretch of land to the westward, an abrupt termination to southward, with a wide strait between the land to north and south. The Demarcation Line appears, as does the land supposed to have been found by the Cortereals. The West India Islands are represented in large numbers, though too far to the north; and to Cuba is given that peculiar hammer-like shape with which we shall meet in many later maps, especially of the Lusitano-Germanic type.

Although the Cantino map seems to indicate a continental region in addition to the islands which had been visited and named by Columbus, it seems very reasonable to assume that the maps of oldest date must have exhibited the lands discovered in the west as a group of islands. In the information furnished by Columbus respecting his first expedition, he wrote, "I have found many islands." Of the islands he was certain; of his having touched the continent of Asia some doubt remained. But of this type of map none is known of earlier date than 1502, which is the date generally accepted for a map which I have called a Munich–Portuguese map, on which sketch, however, there appears neither date nor the name of the cartographer. Like many other maps of that early day it seems, in certain parts, not to be quite up to date, apparently wanting the knowledge which it was generally supposed was possessed at the time when the map was constructed. It exhibits Cuba as an island of great length, extending from southeast to northwest, and the coast of South America with an intentional

break of considerable extent in that region where the Amazon flows out into the Atlantic. To the land of Cortereal a peculiar contour is given, with its eastern shore the same as we find it represented in the Cantino and the Canerio maps. The north continental region is wanting.

As a map exhibiting this apparent want of knowledge up to date respecting discoveries in the west we find no better illustration than is furnished by that of Pilestrina, drawn about the year 1502. It is clearly of Portuguese origin, omitting the continental region of the Cantino map, Cuba and the Spanish Antilles, "although these were discovered, drawn, and described a number of years before Cabral or Cortereal ever crossed the Atlantic." The Portuguese possessions, however, are presented somewhat in detail as the region entered by the Cortereals in the north, and Brazil the region touched and claimed by Cabral in the south.

About twelve years ago, while searching the archives of the Department of Marine in Paris, Gallois discovered a most important marine chart, which is unquestionably of Portuguese origin. It is drawn on parchment, and is the work of a skilled artist. Though undated, it bears the inscription, "Opus Nicolay de Canerio Januensis." Of Canerio very little is known aside from the information conveyed by his chart. That he was proud of his countryman Columbus appears evident from a legend written over the Antilles designating these as "The Antilles of Castile discovered by Collonbo, a Genoese Admiral." It exhibits a striking resemblance to the Cantino chart in its presentation of Greenland, here clearly indicated as a peninsula of Europe, in its presentation of Newfoundland, of the continental region in the northwest, of Cuba and the position of the larger islands of the Antilles, of the coast of South America, of the African and of the Asiatic coasts, which, it should be noted, are no longer Ptolemaic. The recently-discovered Waldseemüller map of 1507 gives unmistakable evidence of an acquaintance with the map of Canerio or a map of exactly this type. It is a map rich in its nomenclature, more nearly accurate in its details, and in its influence of greater significance than the Cantino.

The geographical nomenclature of the early day exhibits some striking peculiarities, and many of these appear on the Canerio map. "The Cape of the Meeting," "The Cape of the Cat," "Cape of the End of April," "The Lake of the Thief," "The Islands of the Giant," "The Coast of the Courageous Man," "The Dragon's Mouth," "The Bay of All Saints," with many other names of like character derived from saints' days, from captains of vessels,

names descriptive and names derived from events thought worthy of being thus recorded.

It is an opinion often expressed in the accounts written concerning the history of discovery in America that the early explorers believed the newly-found regions to be a part of Asia. Columbus is cited as having professed to believe this until the end of his days. But he wrote particularly of islands discovered in his first voyage; in his second he compelled the officers of his vessel to swear, it appears against the convictions of some, that Cuba was a continent; and yet in his third voyage, when he discovered the main land near Paria, and beheld the mouth of the Orinoco, he expressed the conviction that the mighty river came not only from an immense region at the south but from one wholly unknown. In his fourth voyage he made search for a strait through which he might pass to the waters of India, but, failing this, his belief concerning the Asiatic connection, it appears, was confirmed.

I think, with Harrisse, we may say that the moment search began for a waterway leading from Oceanus Occidentalis to Oceanus Orientalis, that moment opinion began to become conviction that a new continental region had been found, a new world had been discovered.

In 1497, John Cabot said that the land he had visited and explored was the country of the Great Khan; but in explaining the project to Soncino in December of that year he expressed the belief that Cathay was on the other side of the newly-discovered land.

In 1503, Vespuccius declared that he had been to a new world, and he followed the coast for many leagues in search of a strait through which he might pass to the Old World.

Humboldt observes "that the more it became gradually recognized that the newly-discovered lands constituted one connected tract, extending from Labrador to the promontory of Paria, the more intense became the desire of finding some passage either in the south or at the north." To find this waterway was the fixed purpose of a number of the explorers, and this at an early date.

What they could not find—though many of the map-makers indicated its existence in the region of Central America—it seems that we are now on the eve of discovering.

While the peculiar configuration of the Cantino and the Canerio charts has occasioned some doubt as to just the belief entertained concerning an Asiatic connection, there appears in the map by John Ruysch, in a Rome edition of Ptolemy, a configuration which

in this particular clearly indicates a compromise. It first attracts by reason of its peculiar projection. It is one well executed, exhibiting in part the Ptolemaic traditions, in part the latest Spanish and Portuguese information concerning the New World, though the evidence is unmistakable that a Portuguese world-map was its real basis.

Greenland appears as a part of Asia, from which region the coast-line sweeps southward, passing Baccalaus and Terra Nova—that is, Newfoundland—then extends westward to join the line which is indicated on the Ptolemaic maps. In the sea which washes Asia is inserted an inscription to the effect that Cipango is omitted because it is thought that country is identical with the Spanish Hispaniola.

On the west of the north continental land the legend appears stating that thus far the ships of Ferdinand, King of Spain, have made their way. To the continent of South America the name "Land of the Holy Cross," or the "New World," is given, with a statement in an adjoining legend that "this country is generally considered to be another continent; that because of its magnitude they called it a New World, for, indeed, they have not seen the whole of it nor at this time have they explored beyond this point; therefore this map is left incomplete for the present, since we do not know in which direction it trends."

Ruysch was a German, who, like many of his fellow-countrymen in those days, found occupation in Italy, and who probably carried with him from his native land knowledge he had there gained concerning the New World. May it not have been true that from the *Cosmographiæ* of Waldseemüller or from his world-maps he acquired considerable information? We read on the east coast of South America this inscription: "Omnium Sanctorum Abatia"—a name which is considered to be the unmistakable evidence of the influence of the St. Dié School of Cartography.

That the Portuguese influence was greater than that of Spain in determining the general appearance of the newly-discovered lands on the maps which are now known of that early day is quite certain.

Why this should be true is not easily ascertained. Perhaps the policy of Portugal was a more liberal one respecting the distribution of knowledge acquired. There are many evidences, at least, to support the belief that a liberal policy was followed. For a number of years, however, following the earliest work of Waldseemüller at St. Dié, it is the German cartography of the New World

which is the most important—German cartography influenced by the Portuguese.

After the hardy navigators who so rapidly took possession of the globe those who rendered the greatest service to geography were the astronomers and the mathematicians, for they alone were able to furnish the information necessary to determine the exact position of places on the earth's surface. It was the good fortune of Germany exactly at this time to be particularly interested in a renaissance of astronomy and mathematics. Here the humanistic movement gave encouragement to a spirit of patriotism, and among other interests to which they directed their talents was that of history and geography. The names and locations of places which they found in the old Ptolemaic maps they soon observed were antiquated and inaccurate; there was need of new maps, and they set themselves to their production. With these efforts modern German cartography had its beginnings.

Not, however, until Duke René of Lorraine became a patron of learning, with a particular interest in cosmography or geography, do we meet with results of far-reaching importance in the cartographical studies of the Germans.

Under the encouragement of this enlightened prince the little town of St. Dié became a centre of culture. Here was organized the Vosgian Gymnasium, a society of learned men not unlike the Platonic Academy of Florence or the Danubian Society of Vienna. Of this St. Dié coterie none were more prominent than Basin de Sandacourt, the translator of the "Four Voyages" of Vespuccius from the French into the Latin; Lud, the ducal secretary and author of an important little work of but few pages, which he called "The Speculum"; Waldseemüller, the professor of cosmography, the author of the *Cosmographiæ Introductio*, and a cartographer of great distinction, who, with Ringmann, planned and carried well on to completion an edition of Ptolemy, which in 1513 was printed in the city of Strassburg. It was probably as early as 1505 that the plan was under consideration for a new translation of Ptolemy from the Greek into the Latin; and that thought, perhaps, had its inspiration in the letters of Vespuccius giving an account of his four voyages, together with some new charts which but recently had fallen into the hands of Ringmann. These charts, says Lud in his *Speculum*, came from Portugal, which, if true, leads one to the belief that they exhibited genuine Vespuccian data.

Whatever the truth concerning the origin of these maps "that

determination has been the starting-point of a most important evolution in the cartographical history of the New World."

"I think you know already," wrote Waldseemüller in April, 1507, to his friend Amerbach, in Basel, "that I am on the point to print in the town of St. Dié the cosmography of Ptolemy, after having added to the same some new maps." While great interest centres in these "new maps," prepared for the proposed edition of Ptolemy, a greater interest now centres in the map or maps to which it is thought Waldseemüller alludes repeatedly in the years from 1507 to 1511, and especially in his *Cosmographiæ*. In the dedication of this little book to the Emperor Maximilian, he says: "It thus happened in collecting for my own book, aided by others, the books of Ptolemy and collating them with the Greek texts, and in proposing to add thereto an inquiry into the Four Voyages of Vespuccius, I have prepared for the common use of students, and as a sort of preparatory introduction, a figure of the entire earth, as well in the form of a globe as a representation on a plane surface." Conjectures concerning this map on plane surface have been many, since all trace of it had been lost until a short time ago. Some, indeed, were inclined to doubt that Waldseemüller completed the work to which he here alludes.

Waldseemüller says further in a passage of his *Cosmographiæ* wherein he gives a description of his new map: "It is my purpose in this book to write an introduction to the cosmography which we have drawn upon a globe as well as upon a plane surface. In the construction of the globe we have been very restricted as to space. But we have had more room in making our map, on which, in the manner as the country people are accustomed to mark their fields and to define the boundaries thereof, we have been careful to distinguish the principal countries of the earth by means of the standards of the rulers." Here follows a somewhat minute description of the way in which he represented the countries of Europe, Asia, and Africa. Adding, "finally, in the fourth part of the earth discovered by the illustrious kings of Castile and Portugal, we have placed the standards belonging to their kingdoms. And what is particularly to be noted, we have marked those coasts which are fringed with shoals, and where consequently shipwreck is to be feared, with figures of the cross, which will serve to point them out."

This is the map now attracting so greatly the attention of students of cartography, and which about two years since was discovered by Professor Fischer of Stella Matutina College, Feldkirch, Austria, in the archives of the Wolfegg Castle.

The size of the map is about eight feet by four feet, which fact suggests that it was intended as a wall map—a form which was little calculated to insure it against destruction. That its twelve parts were bound together probably preserved it. With this 1507 map which Professor Fischer discovered is likewise bound a second one by Waldseemüller, bearing date 1516, and of scarcely less importance. The cover of the collective work exhibits the book-plate of the Nuremberg mathematician, John Schöner.

It is not too much to say of this first work of Waldseemüller that it is the most important engraved map of the first 50 years after the discovery of Columbus, if, indeed, it is not the first printed map on which appears the New World, and that it is the oldest map to bear the name AMERICA—the "baptismal certificate of the New World," as Professor Fischer calls it in a letter I have received recently from him. Printed as it was, according to a legend on the 1516 map, in 1,000 copies, it is reasonable to suppose that it found its way into all sections of the country in which an interest was taken in maritime discovery.

He had followed in its preparation, as he tells us, Ptolemy for certain regions; for other regions the charts which had been received but a short time before in St. Dié, unquestionably from Portugal. The entire map, however, exhibits in its peculiar projection, as in other respects, a striking originality.

As inset map in the north polar region there is presented on the left the Old World with the portrait of Ptolemy, and on the right the New World with the portrait of Vespuccius. Quoting the *Cosmographiæ* again, "We have divided the matter following Ptolemy in the making of the planisphere, except concerning the new lands, and some few other regions, but on the globe which accompanies the planisphere we have conformed to the description of Vespuccius." Can Waldseemüller's reference here be to the inset maps? I am inclined to think so.

Waldseemüller exhibits in his map, however, an inconsistency, showing in the small inset map of the New World a connection between the land to the north and to the south, and in the large map the Strait which all German maps of early date exhibit, with but one or two exceptions, and these exceptions are Waldseemüller maps.

From what I have stated, it is clear that Waldseemüller, as a cartographer, had great respect for Ptolemy, but he observed that "these explanations will be sufficient if we add here that we have not exclusively followed Ptolemy in the delineation of our general

map of the world; especially as to the new lands, in regard to which we have found the equator to occupy on marine maps a position different from that laid down by Ptolemy." How puzzling this matter respecting the location of the equator was to certain early cartographers is well presented in the so-called KING chart of about the year 1502. The Ptolemy maps represented the equator as passing through Western Africa north of the Gulf of Guinea, but Portuguese exploration had shown conclusively that this was incorrect; that the equator passes through the Gulf itself. Our cartographer in the King chart has indicated two equators, one entering Africa on the east and extending westward, another beginning at the east coast and emerging near the proper place on the west. Waldseemüller followed, at least in his maps for the edition of Ptolemy, the construction found in the marine charts.

As we have no earlier suggestion that to the New World should be given the name AMERICA than appears in Waldseemüller's *Cosmographiæ*, and as he alludes in that work to his map of the world, we should naturally expect that name to appear somewhere in the western region; and so it does, written across South America, clearly indicating that he intended the name should be applied to the region which Vespuccius had described in his Four Voyages. America did not yet include the land to the north and the neighbouring islands of the West Indies.

It will not be without interest to attempt to trace, particularly through the German world-maps, the influence of Waldseemüller and of the St. Dié School.

In the passage alluding to the map just described, Waldseemüller, as I have stated, refers to a globe which he had constructed; this is, at least, the interpretation of the statement "quam nos tam in solido quam plano depinximus" (which we have depicted both on a globe and on a plane chart), that has found general acceptance, but I feel inclined to doubt the interpretation.

Such a globe bearing the unmistakable mark of Waldseemüller has never been discovered. However, in the collection now belonging to Prince Liechtenstein is a somewhat crudely-executed gore map. As a title to the lithographic reproduction, which I have recently received through the courtesy of the Prince, is the following statement: "First printed globe. Martin Waldseemüller. Probably belonging to his book GLOBUS MUNDUS, which appeared in 1509." But there is very little evidence to show the connection of Waldseemüller with the GLOBUS MUNDUS, or that these gores were constructed for that little work. Between the lands to north

and south there is no connection indicated. It is a work, therefore, of the Lusitano-Germanic type, if not a Waldseemüller map. Until the recent discovery of Professor Fischer, to these gores belonged the distinction of being the oldest known printed map on which the name AMERICA appears, if we accept the date 1509.

To a second gore map, for which the claim has been advanced that it is the work of Waldseemüller, or the copy of an original by him, because found in an edition of his *Cosmographiæ*, reference may here be made. The copy is usually referred to as the Tross Gores or the Boulengier Gores, and is one of the choice treasures of the Lenox Library. It bears no date, but is thought to have appeared some time between 1514 and 1518. It is a copper engraving, well executed, across which appears the legend, "Universalis cosmographie descriptio tam in solido quem plano"—a quotation, with a mistake or two, from Waldseemüller.

The continental land to the north-west is clearly of his type of map, showing a break of considerable width in the continuity of the east coast-line in the region of Central America. Across the southern continent appears the inscription "AMERICA NOVITER REPERTA," while the north bears only the name "NOVA."

Of no less interest than the gores to which I have just called attention are the two maps discovered recently by Professor Elter of the University of Bonn, in a work by the theologian and humanist Glareanus, a native of Switzerland—maps which bear a close resemblance to two others discovered by Professor Wieser a few years ago in Munich. One of these Bonn maps bears the inscription "Coloniæ Agrippinæ anno M.D.X." Professor Elter refers to it as the oldest map bearing the name America, very naturally overlooking the Waldseemüller map of 1507. It gives unmistakable evidence of an acquaintance with the work of Waldseemüller—indeed it is almost an exact reproduction of that map, though greatly reduced in size, and this may be seen in the form in which it is projected, in the contour of both the Old and the New World, in the legends which appear in the border as in those which appear on the lands of the west. Reference is made to the discoveries of Vespuccius, and to his Four Voyages, in which the new lands are described. The contour of the north continental region is strikingly that of the Canerio type, while that of the south is so sketched as to give evidence of an advance in knowledge over Canerio respecting the general outline; conjecture, however, seems still to guide the pen of the draughtsman in much that he has attempted to show of the world. In his writings

Glareanus appears to have exhibited considerable interest in the problems of map construction, but he is not at all times inclined to give full credit for the sources of his cartographical or geographical information.

The Stobnicza maps, to which so much importance hitherto has been attached, are rude woodcuts, and are to be found in a very rare work on the subject of cosmography. They were produced in Cracow, Poland, in the year 1512. In the discovery of Professor Fischer they have been deprived of almost every claim which in the past has given them distinction. That we have in this work the oldest map in which North and South America appear as a continuous body of land can no longer be claimed for it, since the inset map of the Western Hemisphere, a part of the Waldseemüller of 1507, is clearly its original. The claim that these are the oldest maps on which the earth's surface is represented as divided into two hemispheres falls, as does the claim for originality of projection.

The ORBIS TYPUS UNIVERSALIS of the 1513 edition of Ptolemy has received new confirmation by the recent discovery that it, together with others in that edition, is the work of Waldseemüller. While exhibiting differences in construction from other New World maps, it does present the land connection between the north and the south, leaving to conjecture, however, his belief respecting the western coast.

Nordenskiöld is inclined to the belief that the new maps of this edition of Ptolemy are not the work of Waldseemüller, and he takes from him much of the credit for ability as a cartographer which has been attributed to him. Perhaps the strongest argument supporting a claim for him as the draughtsman of those maps in the 1513 Ptolemy, though it is not the only argument, is the statement to be found in the Strassburg Ptolemy of 1522. In the advertisement of Lorenz Friess, on the verso of the one hundredth leaf of that issue appears the declaration "that these maps were originally constructed by Martin Ilacomylus (Waldseemüller) now deceased, and they have been reduced to a smaller scale than ever before."

The maps of the 1513 edition of Ptolemy show many marks of improvement, especially in matters of detail, over the Ptolemy maps of earlier date. This may be clearly seen in the map of India, the general contour of which we find to be of the Canerio type; so striking, indeed, is the resemblance that one is immediately impelled to the conclusion that a Portuguese map was followed.

It was fifty years ago that Alexander von Humboldt, in his critical studies respecting the historical development of the geographi-

cal knowledge of the New World, expressed the belief that the name America appeared in print for the first time in the 1507 edition of the *Cosmographiæ*. The passage is one now well known: "And now indeed these parts have been more widely explored, and another, a fourth part, of which we will presently speak more particularly, has been discovered by Americus Vespuccius; I do not see why it may not be permitted to call this fourth part after Americus, the discoverer, a man of sagacious mind, by the name Amerige, that is to say the land of Americus, or America, since both Europe and Asia have obtained their names from women."

But on what map did that name first appear? To some of those for which the claim has been advanced I have referred. That honour, thought Humboldt, belongs to the APIANUS map of the year 1520, to be found in an edition of Solinus, by Camers, of that date; also in an edition of Pomponius Mela by Vadianus of 1522. It can, therefore, claim the distinction of being the oldest map known bearing the name America at the time the discovery by Humboldt was made of the origin of the name.

Apianus clearly borrowed his data from a Portuguese map, but a Portuguese map modified by the German cartographers. The projection was long considered to be somewhat new and original. And yet here, as in other maps to which I have referred, the evidence now appears to be convincing that the Waldseemüller map served as model.

Aside from the facts referred to the map exhibits certain other features which are worthy of notice. A legend on the Southern Continent records the discovery of that region in 1497, but Apianus does not distinguish clearly between Vespuccian and Columbian data, for in the legend below the date he records: "This land, with the adjacent islands, was discovered by Columbus, a native of Genoa, at the command of the King of Castile." He alone of the early cartographers designates the region as the "Province of America."

Apianus made many maps, as we are told, and appears to have preferred this particular projection.

In the course of my correspondence with Tadeus Estreicher, of Cracow, Poland, I have from him a copy of a world map which, he writes, he has recently discovered. Details concerning its history he omits. It is a rude woodcut, apparently not one of great importance, but interesting as bearing a striking resemblance to the Waldseemüller map, particularly in the contour of the western world.

Such are the maps of greatest importance produced in Germany

on plane surface and from Portuguese originals, during the first quarter of the sixteenth century, and unsurpassed by those produced in any other of the European countries during the greater part of that time, in so far at least as the maps then produced are now known.

If the St. Dié influence was so marked, as I have indicated, on the maps *in plano*, it is found to be none the less so in a number of globes constructed during the same period, to a few of which only can reference here be made.

Johann Schöner, who, as I have stated, was at one time the possessor of the maps discovered by Professor Fischer, was one of the most distinguished mathematicians of Germany of that period. Cartography was a subject of special interest to him, and no less than five globes are known which on good authority are attributed to him. The first of these, thought to have been constructed in 1515, and to be the globe referred to in a little work of his of that date on cosmography, is preserved in the City of Weimar, and a duplicate, according to Wieser, is to be found in the city of Frankfort.

Schöner observes in his little work that the three parts of the earth Europe, Asia, and Africa are united to form one continent; that a fourth part has been discovered recently, and that it is composed of islands. And this he indicates on his globe, if we may so interpret the fact that he does not connect the land to the north and the south; that he does not leave the western coast-line with simply a meridian boundary, as in the Stobnicza, the Tross Gores, and the so-called Globus Mundus. The entire region is represented as surrounded by the sea. To the southern continent he has given the name America and to the northern Parias. He has inscribed a number of new names, and, what appears to be original with him, he represents an austral continent, which land, "Brasilia Regio" he calls it, has given rise to many questions respecting the origin of the information he appears to have possessed at this early date. Probably he had his information from the rare German pamphlet bearing the title "Copia der newen Zytung aus Presillig landt." The information in this little publication appears to have been originally given by a representative of the rich Welser House of Augsburg, who looked after its interests in Lisbon. "He declares himself to have been a great friend of a captain who said that his expedition had sailed through a strait at the south of Presill, but that he had there been forced by contrary winds to return." The earliest account of the voyage of Magellan says that he had access to a globe

on which were indicated the straits at the south of Brazil; and this may have been the Schöner globe.

In 1520, Schöner produced a globe much larger than the first, and one now much better known. It differs but little, however, from the one of 1515, save in the matter of detailed information given in the legends. And who, having seen the Waldseemüller maps, would call in question the influence of the St. Dié school of cartographers?

There are, however, globes of a somewhat different type which were produced in this period—globes which do not give so much evidence of the Vosgian influence, which clearly are not the work of Schöner, but which probably were the work of German artists.

Of this type the Lenox Globe may first be named, thought by De Costa to be the oldest post-Columbian globe. To the contour of the western land I wish to call attention, likewise to the fact that a north continental land is omitted, and that the large island off the coast of India wants a name by which to distinguish it. That the newly-discovered region was a group of islands seems to have been the opinion of the artist. He has approximately accurate the shape of South America, and to Cuba has given the general appearance we meet with in the Portuguese–German maps.

It was but recently that Tadeus Estreicher described for the first time a globe now in the possession of the University of Cracow. This globe constitutes an important part of an old clock, being the box in which the works have been placed. Though the clock is one long in the possession of the University it was not until very recently that the copper ball was found to have engraved upon it a map of the world. So striking is the likeness to the Lenox Globe that at first sight one is inclined to call it an exact duplicate. There is, however, a difference in diameter to be noticed—the Lenox having a diameter of five inches, the Jagellonicus a diameter of about three.

As for the western continental regions the difference is but slight. In nomenclature the smaller appears to be the richer, but a feature of striking interest is to be seen in the legend on the large island southeast of India. Here we read "AMERICA NOVITER REPERTA"—the first time, so far as I have been able to ascertain, that America became mixed up in Asiatic affairs, and there is evidence that Waldseemüller may have been responsible for this.

In his *Cosmographiæ* appears this sentence (the order in which the regions are mentioned is, perhaps, not without significance):

> In the sixth climatic region, toward the Antarctic, are situated the extreme parts of Africa, lately discovered, and the islands of Zanzibar, Java Minor, and Seula, and

a fourth part of the world which, because Americus discovered it, it is proper to call it Amerige, that is the land of Americus, or America.

The globe gores, thought by Major to be the work of Leonardo da Vinci, because found in a collection of his papers preserved in the archives of Windsor Castle, seem to give evidence of an acquaintance with the Lenox and the Jagellonicus type. The projection is an unusual one. The large western island bears the name America, and it was thought by Major to be the oldest map sketch containing that name. Aside from the appearance of the name America at so early a date—Major thought about 1514, others have placed it about 1518—it has no great significance in the history of the development of the New World cartography.

The influence of the St. Dié School of cartography is easily traceable through the cartography of the century. There is not, however, to be noticed a rigid adherence to the ideas so early expressed respecting the New World, but the form of projection employed and the general contour of the new regions laid down in the early Portuguese and Portuguese–German maps are often repeated.

In 1532, Munster shows a preference for this over the outline as it was now appearing in the Spanish maps, such as the Salviati and the Ribero; and Finæus gives evidence of being strongly influenced by that same Waldseemüller type.

In the little map of Honterus, appearing in his Rudimenta Cosmographica, 1546, and several times thereafter, we have as near an approach to an exact copy of the 1507 map as can be found in the large number of imitations. It is not surpassed by the Glareanus maps; but none, so far as I know, had, before the discovery by Professor Fischer, ventured to claim for it the distinction to which I have just referred.

The most striking features of the Lusitano-Germanic cartography, as I have attempted to show, are an indicated continental region in the west, clearly not a part of Asia, a strait between the continental land to north and that to the south connecting Oceanus Occidentalis with Oceanus Orientalis, and the southern region very early taking the name America.

With the exception of the Bartholomew Columbus maps, discovered but a few years ago by Professor Wieser, and Spanish maps, rather than Portuguese, none of the early maps clearly indicate a belief in an Asiatic connection of the western lands. Quite the contrary, as I have stated. But in 1526 we meet with an interesting reversion to the idea which Columbus professed to enter-

tain. By some of the students of that early cartography this reversion is to be attributed to the letters of Cortes, and the observations of Peter Martyr, in his Enchiridion. Perhaps it was from Schöner's Globe of 1523, and the small tract which he wrote in that year, that the idea of such an Asiatic connection was derived, which idea for many years found favour with certain cartographers. Calling attention in his tract to the Magellan voyage, and other matters pertaining to western discovery, especially to the discoveries of Columbus, and of Vespuccius, he observes, "They call it America, the fourth part of the globe. But very lately, thanks to the recent navigations accomplished in the year 1519 by Magellan... it has been ascertained that the said country was the continent of Upper India, which is a part of Asia." The idea won favour, but it seemed to come and go with the years from this time on, as fact or fancy dictated, until the discovery of Bering put an end to the controversy. The idea should perhaps not be called Lusitanian, but I feel inclined to think a large share of the responsibility for spreading the idea rests upon German students of New World geography, though the question is yet an open one.

In a work by Franciscus Monachus, a Belgian monk, which he called "De Orbis Situ," and which was printed in Antwerp in the year 1526, the idea of an Asiatic connection is first clearly expressed on a map. In the text Franciscus takes occasion to criticise the Ruysch map of 1508, which indicated that the north continental region is separated from the south. He further states, what he finds to be a common belief, that a sea exists between the New and the Old World—that is, between America and Asia, but to this opinion he likewise raises objection.

The map, therefore, though apparently of little significance, has a certain importance by reason of this indicated Asiatic connection, by reason of its presentation at this early date of an austral continent, and the continuous coast-line from the extreme north to the extreme south and its west coast-line extending to join Asia.

There were many maps drawn before the close of the century, which, like the Franciscus, indicate this Asiatic connection. However, by 1525 a Spanish type of map of the New World was coming into prominence, and was finding a wide acceptance. It is best represented in such maps as those of Ribero, of Agnese, and of Cabot, so far, at least, as the eastern coast-line of the New World was concerned.

I have given here but a brief review of some of the more important early maps of discovery and exploration in the New World,

most of which are of the Portuguese–German type, but I trust the sketch is sufficient to give a fair understanding of the significance attaching to this cartography. With the 1538 map of Mercator I may fittingly close. It is one of the first of that great cartographer, and a copy of it is now in the possession of your own Society.

Waldseemüller applied the name America to the southern continent. Mercator gave it also to the northern. Waldseemüller evidently thought the new country a region separated from Asia, and this is an opinion also expressed by Mercator in his map. Passing over the idea of Franciscus that the new country was a part of Asia, and the Spanish idea that such connection was possible though unknown, Mercator gave the western continent a contour approaching accuracy.

NEW BOUNDARY BETWEEN BRAZIL AND BOLIVIA.

(MAP, Page 256.)

The long dispute between Brazil and Bolivia over the possession of the large territory known as the Acre district has at last been settled by the adoption of a boundary treaty, signed at Petropolis, on November 17 last, ratified later by the respective Governments and proclaimed on December 28. Our map, showing the new boundaries established by this treaty, has been reproduced from the official map issued by Brazil. The treaty not only adjusts the boundary questions relating to the northern frontier of Bolivia, but also the smaller question concerning the boundary between the two countries south of Matto Grosso. An inset on the map shows the slight changes in the latter part of the boundary.

The treaty provides that a Mixed Commission, appointed by the two Governments, shall demarcate the new frontier. Their work may slightly change the position of parts of the boundary, for the reason that the geographical data at hand, when the treaty was made, were not sufficient at several points for a sharp definition of the frontier. The treaty provides, for example, that from the source of the Iquiry River to Bahia Creek the boundary shall follow the highest elevations of the land or a straight line, as the boundary commissioners shall deem most convenient.

If any controversy arises between the Brazilian and Bolivian commissions which cannot be settled by the two Governments, it is to be submitted to the decision of a member of the Royal Geographical Society of London, chosen by its President and the Council.

The map shows that while a large amount of territory is given to Brazil the Republic of Bolivia receives in exchange no equivalent area. For this reason Brazil has agreed to pay to Bolivia an indemnity of £2,000,000 sterling, which Bolivia accepts, with the intention of using the money chiefly in the construction of railroads or other works tending to improve the communications and develop commerce between the two countries.

The treaty stipulates that within eight months the two Governments shall conclude a Treaty of Commerce and Navigation based upon the principle of the most ample freedom of transit and river navigation to both countries—a privilege which they shall enjoy perpetually, on condition of their respecting the fiscal and police regulations established in the territory of each. These regulations shall be as favourable as possible to navigation and commerce, and, as nearly as possible, uniform in the two countries.

Brazil has agreed to build on Brazilian territory, by itself or by a private company, a railroad to extend from São Antonio, on the Madeira River, to Guajará-Mirim, on the Mamoré, with a branch road running through Villa-Murtinho or another point near it, in the state of Matto Grosso, to Villa Bella, at the confluence of the Beni and Mamoré. Brazil will endeavour to complete this road within four years, and both countries shall use it, with right to the same immunities and rates.

The map shows the route of the railroad which Brazil will build around the falls of the Madeira and lower Mamoré Rivers. This route will be of great advantage to the commerce of Bolivia, which sorely needs an outlet to the Atlantic. Most of its exports are now carried at large expense to the Pacific, where they are still many thousands of miles from markets. Few of its products that are less valuable than silver, tin, and copper can bear the high tax of such expensive transportation. Unfortunately, between São Antonio, on the Madeira, and Guajará-Mirim rapids, on the Mamoré, the two rivers pass across a zone of granitic rocks 240 miles in width, forming rapids and cascades. The highest fall has a drop of forty feet, and the others vary from thirty feet to a few inches. In this stretch, of about 300 miles, the native boatmen have to haul their boats and freight around the forty-six falls; so laborious a process that from two to three months are required to make the ascent from the lower to the upper reaches. It is this obstruction to the navigation of the largest tributary of the Amazon that is now to be circumvented by the railroad which Brazil will build.

A SUMMER IN TURKESTAN.

BY

W. M. DAVIS,

Sturgis-Hooper Professor of Geology in Harvard University.

A rapid journey across Turkestan in the summer of 1903, as a member of Professor Raphael Pumpelly's Carnegie Institution Expedition, gave me a general view of that remote country, and answered many questions that had arisen on the way there; but it left many more unanswered and in a most interrogative attitude. The latter will, I trust, be followed to a solution by my associate, Mr. Ellsworth Huntington, who remained in Asia after my return, and who went eastward in the autumn as far as the desert plains around Kashgar, in Chinese Turkestan, and southward in the winter as far as Seistan, on the eastern border of Persia. Only a brief narrative is offered here; a fuller account of my journey will be published by the Carnegie Institution; but first should come a few general considerations.

Nothing can be more natural than the extension of the Russian empire over the mid-latitude plains east of the Caspian. There was no topographic barrier to hinder the advance—nothing but the difficulty of progress across the desert, and this difficulty did not suffice to call a halt, for progress has not stopped until the mountains were reached on the south and east, where it seems as if the earth's crust itself had risen to set limits to the growth of the Czar's dominion. The range of the Kopet Dagh is a rampart along the southern border of the deserts of Turkestan; beyond this natural wall the basins of Persia are comparatively safe. The ranges of the Tian-Shan and the lofty highlands of the Pamir limit the plains on the east; and beyond these formidable barriers the interior deserts of Chinese Turkestan are fenced off from easy conquest. It is only on the southeast, towards Afghanistan, that the present boundary is unstable; it is there drawn across a corner of the plains, where it may be easily disturbed; and to this part foreigners are not allowed access.

There is much in the history of this progress from which an interesting analogy is to be drawn with the expansion of our own mid-latitude domain in North America; for it is to North America

alone that nearly all of Europe–Asia should be compared, in spite of notable differences of size. Our advance westward across the plains of the Mississippi basin towards a drier and drier interior region corresponds to the advance of Russia eastward into the Trans-Caspian country. It is only a fictitious system of land division and of world-naming that makes the Russians appear to have transgressed the limits of a continent, while our own mainland progress has respected them. But while in our case the further mountain system was found to be of medium breadth and height, and the native population that preceded us southwestward was small and weak, the further mountain systems that impede the southeastward progress of Russia are vast in all their dimensions, enclosing extensive desert basins and plateaux; and beyond them dwell the two teeming populations of the world. It is, therefore, with our position during the first half of the nineteenth century, after the Louisiana purchase, and before the acquisition of California, that the present position of Russia in Central Asia—not Siberia—should be compared. And with our later history Russia is not likely to run a parallel, for we found only a remote offshoot of Spanish power along the coastal slope of the further ocean; while Russia is preceded in India by strongly-entrenched British power, and for China and Japan there is no American homologue. We crossed North America because it is a handy-sized continent, whose most productive zone is not too wide for the stretch of a single nation. Eurasia is, on the other hand, an overgrown continent, and Russia traverses it only in the higher latitudes, where the native population is relatively small, and where the mountain barriers are least troublesome. It is, therefore, with Canada in North America that Russia in northern Asia should be compared to-day.

The half-century difference of American and Russian dates results in different methods of progress. Our extension into the Louisiana purchase began before steamboats and railroads and telegraphs were included in the usual order of things. Russian progress into Turkestan was in a more modern era, and the construction of the Trans-Caspian railroad had not long to wait after the decisive massacre at Geok-Tepee. Our party crossed the sea from Baku to Krasnovodsk last May in a fine steamer—a run of eighteen hours—and the next day we saw the unmitigated desert from our car windows. From first to last our journey was favoured by the Russian authorities; every official, from his Excellency the Governor-General at Tashkent down to the porters on the special cars

that were assigned for our use over the whole length of the railroad, gave us most considerate assistance and service.

At Krasnovodsk and for a hundred miles inland, as well as at Baku on the western coast, we saw the former shore lines of the expanded Caspian plainly recorded up to altitudes of two or three hundred feet above its present level. I felt, however, that there was much reason to doubt the former great extension of the sea far eastward over all the desert to the Afghan boundary, as has been inferred by some of the Russian explorers. And here arose one of the problems to which further study might so well be given. In spite of all the excellent work that has already been done, that of Konchin being

OIL WELLS AT BALACHANY, BAKU.

the most detailed, there is as yet no sufficient understanding of the quaternary Caspian; a monograph on its variations would form a fine Asiatic sequel to the reports by Gilbert and Russell on our quaternary Lakes Bonneville and Lahontan; but whoever undertakes this work must learn to live in the desert.

The railroad follows for over three hundred miles the belt of oases along the northern base of the Kopet Dagh. Here we had fine views of the sharply-dissected bare mountains and of the long, gravelly piedmont slope, spreading in fans from the mouth of each valley. Where the surface streams do not suffice for irrigation, gently-ascending tunnels are driven into the gravel, and thus the ground-water from near the mountain base is led out to irrigate the further forward slope. The irrigable belt is, however, only a

few miles wide; it is succeeded northward by a vast area, where dunes occupy much of the surface, the desert of the black sands—the "Kara Kum." After one of the heavy rains which the clouds occasionally furnish the mountains, the piedmont slope is washed with local floods, which may advance some distance into the dunes before the water soaks away. We followed the dry pathway of such a flood into the dunes north of Bakharden, but the persistent water supply here was too small and uncertain to tempt more than a few poor Turkomen to subsist on its dwindling stream.

In Askhabad, the capital of Transcaspia, we were courteously received by the Governor, who detailed his aide, Wasili Gregorievitch Yanchevetski, to accompany us on a short trip over the

ENCAMPMENT OF KURDS IN THE KOPET DAGH MOUNTAINS.

mountains into Persia, and thus provided us with a most helpful and genial companion. In this excursion over the Kopet Dagh we met the nomadic Kurds pasturing their flocks in the higher valleys. It was remarkable to note how effective a few thousand feet of elevation was in changing the climate from desert aridity to sufficient humidity, and in replacing the parched lower plains with grassy uplands. The mountains were composed of Mesozoic limestones, compressed into rather disorderly folds, as has been described by Bogdanovitch. Where we crossed the range it has once, at least, been worn down to moderate relief—not to a plain, but to relatively subdued form; its present altitude is due to a subsequent localized longitudinal uplift, in mass, as is shown by the way in

which the present valleys are incised beneath the floors of the former valleys. There are some beautiful physiographic problems here awaiting solution. We had a general view of some of them from the main crest, where we looked down from a height of 9,000 feet to the desert of Turkestan on the north and to the ranges and basins of Persia on the south.

East and northeast of Askhabad, as the railroad traversed the great plain, we saw some of its rivers. First the Tejen, whose recent flood had swept away the rail bridge; a temporary foot-bridge gave us a crossing. In spite of the large volume of water that was passing at the time of our visit, the plain hereabouts has small population; the river is too variable to be trusted for irrigation. Further on the Murg-ab is less variable; it is divided into many canals to water the famous oasis of Merv, a true delta in a desert. Still beyond is the great Amu, the ancient Oxus, crossed by a long bridge at Charjui; a large oasis is here under cultivation. While the Amu still reaches the Aral sea, the Tejen and the Murg-ab wither away in the desert. As they weaken and vanish, their abundant sediment is deposited; and thus a considerable thickness of the plains strata must have been been built up. It is doubtful if the world anywhere affords a better example of a fluviatile plain than is to be seen here. The plains of northern India, as described by Medlicott and Blanford, and those that stretch eastward from the Rocky mountains, as best described by Johnson, are of the same kind. But these two great examples are to-day largely in process of dissection by their rivers; while in Turkestan the plains are still growing higher and higher by fluviatile aggradation. A sight of the plains of Turkestan is, therefore, to be strongly recommended to any one who is so deeply imbued with the importance of the destructive work of rivers that he hesitates to attach much importance to their constructive work. Every grain of sand and silt that the Tejen and the Murg-ab bring from the mountains of their upper courses must be deposited on the plains, where their lower courses wither away. The plains are dead level to the eye; yet the muddy rivers detect a slope and flow rapidly forward to their extinction. The habit that these rivers have of flowing *on* the plains, instead of in valleys eroded somewhat below the plains, is highly suggestive. Such a habit is easily explained as a necessary consequence of the formation of the plains by the rivers; it would be difficult to explain it if the plains had been laid down in a sea or lake basin and then laid bare by uplift. The latter case would involve the chance agreement between two slopes—one,

the slope of the uplifted plains; the other, the slope of the rivers. A chance agreement between such slopes must be rare, and for this reason alone it is probable that the southeastern plains of Turkestan are largely composed of river-laid strata. If the expanded Aralo-Caspian sea stretched so far eastward in quaternary time, its sediments are now well buried.

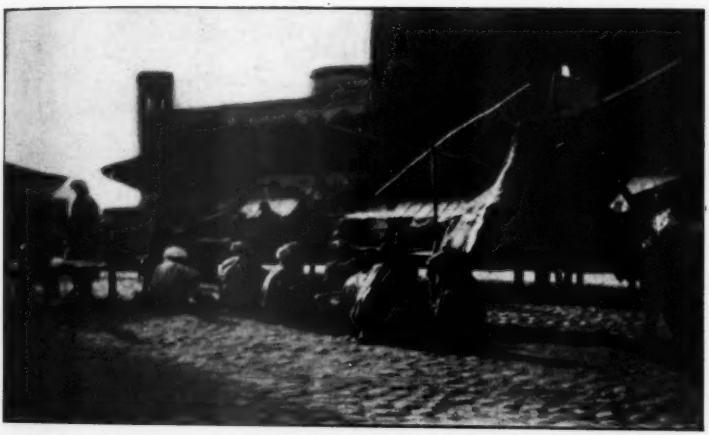
We saw more in bazaars of modern Merv and in the ruins of ancient Merv than can be written down; but the hospitable reception we met at the hands of the Superintendent of the Czar's Estates at Bairam-Ali, as old Merv is now called, and the comfortable sojourn that we made in his mansion must not go unrecorded. Samarkand fulfilled our imagined picture of an oriental

STREET SCENE IN SAMARKAND.

city—the famous mosques and tombs, dignified even in dilapidation; the little open shops, where one sees the artisans at work; the strange costumes of gaudy colours; the silks of curious patterns. The memory of Tashkent has its foci in two delightful entertainments—an evening with Governor-General Ivanof, who furnished us with letters that opened all the gateways on our further road; a noon with Messrs. Polovzoff and Andraef, whose knowledge of languages, European and Asiatic, excited our lively admiration. It was from Mr. Andraef that we learned the device of carrying coloured cotton handkerchiefs as "small change" with which to pay the Kirghis for supplies and service up in the mountains.

The branch railroad to Andizhan, a good thousand miles from

Krasnovodsk, on the Caspian, led us through the province of Ferghana, a fertile district, because it is an eastward re-entrant of the plains and receives many rivers from the western members of the Tian-Shan system and the Alai range that borders the Pamir. The Alai was seen rising in many snowy peaks of fine Alpine form. Here the Syr, the ancient Yaxartes, is the main river; its branches are largely used for irrigation, and the population suffices for the development of a number of good-sized cities—Khojent, Kokan, Margelan, Andizhan, Namangan. Much silk is raised and woven in this province. We often saw men riding into the cities carrying large bags of cocoons hung on a long pole that lay across the saddle-bow. Much unspun silk is now sent to Lyons. Cotton is also ex-



MARKET PLACE IN SAMARKAND.

tensively grown; American cotton seed, introduced only a few years ago, being in high favour. We passed many rice fields, delicately terraced and banked to hold water on the gently-sloping plain. The village houses are small, and are so well hidden by trees that one wonders where the people live. At Margelan we enjoyed the hospitality of the Military Club, where acceptable strangers are admitted to the privileges of temporary membership on the payment of a small fee. The accommodations found there were far superior to anything that the lodging-houses of the place afforded; while the polite attentions of the Secretary of the Club made us feel thoroughly at home.

It was at Andizhan that our party divided: Mr. Pumpelly, with

three others, going southeast, across the Alai and the Trans-Alai ranges to Lake Kara-kul on the Pamir; while Huntington and I went northeast to Lake Issik-kul amid the ranges of the Tian-Shan. Serge de Brovtzine of St. Petersburg, who had thus far been interpreter for the whole party, now was assigned to my division, and made himself indispensable. Andizhan had been greatly injured by an earthquake in March, 1902; the ruins of shattered houses were still seldom cleared up; many of the Russians lived in box freight cars that were standing on temporary tracks in the streets near the station; while the natives often occupied wretched hovels. The local Governor was still encamped in his garden, his new residence not being quite finished. He and his aides were most atten-

POTTER'S PLACE IN SAMARKAND.

tive in helping us to buy our horses, to hire our men, and to collect the necessary supplies. He summoned a neighbouring chief, the Min-bashi of Kugart, to meet us in the city and to escort us through his department, and under these favourable conditions our journey to Issik-kul began. Mr. Huntington has written so full a narrative of this part of our experiences that I shall not dwell upon them, more than to remark that our month on the way was like a long picnic, with science and entertainment delightfully blended. Our men were faithful servants to the last. The Min-bashi, with whom we started, showed us polite and gentle consideration. The nomadic Kirghis, whom we met repeatedly in their summer encampments among the almost treeless mountains,

treated us in so friendly a way that we had no reason to speak of them unkindly, as the Russians usually did. We were made much of in their villages; a good yurt, or felt-covered tent, was placed at our disposal, and carried to a fresh patch of grass before the clean felts, rugs, and quilts were spread in it for our use. We saw repeated instances of extinct local glaciation in the higher valleys, and found some excellent illustrations of newly uplifted mountains, which I shall describe elsewhere; and so we reached Issik-kul.

Issik-kul, or Issik-lake, a hundred miles long, from thirty to forty miles wide, and about a mile above sea-level, stands in a peculiar relation to the River Chu, that flows past its western end. The Russian maps showed the lake and the river to be joined by a

HEAD-MAN OF KIRGHIS VILLAGE AND HIS SON.

short stream, the Kutemaldy, which we not unnaturally took to be the lake outlet—a most respectable error, inasmuch as we were preceded in it by Humboldt and Ritter! But the stream, when it flows at all, runs from the river into the lake, and the lake is slightly brackish. The content of salt is not, however, so great as would be expected, if the lake had never overflowed since its basin was first depressed between the adjoining ranges; and the flat gravel plain between the river and the lake makes it very probable that the Chu was once both an inlet and an outlet for Issik-kul, the upper river flowing northeastward into the lake, and thus causing it to overflow northwestward into the lower river. The change from these conditions to the present was probably brought about spon-

taneously by the river itself; the inlet seems to have built a fan delta, on which a chance diversion of its course led it directly to the outlet. The Kutemaldy is of similar natural origin, being a distributary of the Chu at the elbow where its upper and lower courses to-day join.

But the changes in Issik-kul are not only those that have been determined by its variable relation to the Chu. Several abandoned shore-lines may be traced around it, up to about twenty-five feet above its present level; hence it has been higher than it is now. These shore-lines are continued across the floors of shallow valleys, which themselves are slightly invaded or drowned by the lake waters; hence the lake was lower than it is now before it was higher. The drowning of the valleys is hardly perceptible at the west end of the lake, but it is strongly pronounced at its east end; hence the lake basin has been relatively depressed to the eastward. The drowned valleys of the east are eroded in a plain of horizontally-bedded sediments, apparently of lacustrine origin; hence the lake was once decidedly higher at its east end than it is to-day. These changes are of interest in their physiographic relations alone, but they have a human interest also; for it is credibly reported that the ruins of houses are to be seen beneath the waters near the eastern end of the lake; and we were shown a square brick that was said to have been dredged from the lake bottom near the drowned houses. Here is work enough for an entire summer, and we had only a week for it!

Moreover, the origin of the lake basin deserves attentive study. It seems to be in genetical contrast to the uplift of the mountain blocks on the north and south. The uplifts were long enough ago for the formation of stony piedmont waste slopes, which greatly decrease the beauty of the lake, as they are several miles wide on each side; the material of the slopes having been eroded from the valleys in the mountain blocks. One slope faces southward to the noonday sun; the other descends northward from it; hence the surrounding ranges are called by the Kirghis the Kungei (midday) Ala-tau, and the Terskei (midnight) Ala-tau. Small glaciers occur to-day near the summits of these ranges; larger glaciers once occupied the high valleys and laid moraines in them. It is probable that close study would discover a point where the glacial record and the lacustrine record could be compared. Here is a fine problem for some less hurried traveller.

The mountains themselves near Issik-kul interested me greatly, because they appeared to be tilted and carved fault-blocks, such as

Gilbert and Russell have described for the Great Basin of Utah and Nevada. This origin seems to be particularly appropriate for the Alexander range, that stretches westward from the lake, as far as our sight of its eastern end could determine. It is composed, where we saw it, of crystalline rocks; the northward slope is precipitous and deeply dissected; the southward slope is remarkably even when seen in profile from a distance, and but moderately dissected when seen from the southern base; next, south of the range is an open basin, occupied by subrecent deposits. All of this is consistent with the supposition that the mountain mass is an uplifted part of a peneplain of erosion, that fracture and uplift on the north were accompanied by tilting and relative depression on the south, and that these movements are ancient enough to allow a significant amount of consequent erosion, especially on the northern or faulted face of the block, and to allow the heavy burial of the southern or depressed part of the block. If it had not been for the deposition in this basin of the waste brought by the upper Chu from its mountain gorges, the western end of the Issik-kul basin would probably be much more filled up than it is.

Huntington set out from Issik-kul on his journey southward over the Tian-Shan mountains to Kashgar; while Brovtzine and I posted northward in a springless tarentass past Vyerniy to Semipalatinsk—nearly a thousand miles in a week, not counting a two days' stop at Vyerniy. We followed down the Boam gorge of the Chu for some thirty miles, along which the river is rushing at torrential speed; the steep gorge walls and the rapid descent of the channel testify to the subrecent date of the regional uplift that the Tian-Shan must have hereabouts suffered. North of Vyerniy we crossed subdued mountain ranges, and on nearing Semipalatinsk, on the Irtysh, in Siberia, we traversed a great steppe of small relief, a worn-down surface of crystalline and greatly-deformed stratified rocks; by far the best undissected peneplain I have ever seen. I am tempted to generalize here: the uplifted peneplain that is seen on the back slopes of the mountain blocks around Issik-kul, and that occurs much more extensively further south in the Tian-Shan, as reported by Huntington, was probably once continuous with the peneplain that still lies low about Semipalatinsk; and the difference between the strong relief of the Tian-Shan and the monotony of the steppes in the bordering part of Siberia is chiefly due to the invasion of the former area by the telluric forces of deformation and uplift, while the latter area still lies quiescent.

From Semipalatinsk we descended the Irtysh in a commodious

steamboat, and at Omsk took a west-bound express on the Siberian railway; and so entered Europe early in August. It may be noted in closing that Mr. Pumpelly is now—March, 1904—again in Turkestan, where he is continuing his studies under the most favourable conditions.

THE ANNUAL REPORT OF THE COAST AND GEODETIC SURVEY FOR 1903.

Aside from its scientific interest as a record of progress in geodetic and terrestrial magnetic measurements, the present Report contains a large volume of results of the highest economic value. The precise levelling operations that have been carried on by this Survey and their interlocking connections with the similar measurements that have been executed by the Geological Survey, the survey of the Northern and Northwestern Lakes, the Mississippi River Commission, the army engineers, the great railroad corporations, and by the State of New York in connection with the contemplated improvement for water-borne traffic between New York Harbour and the Great Lakes are scientifically discussed and summarized in an extensive and valuable report, which has an intimate bearing upon the industrial development of the country.

A large amount of progress was made at an unusually rapid rate in the extension, from Kansas to the Rio Grande, of the primary triangulation for the measurement of the arc of the 98th meridian in its extent throughout the United States. Beyond the interest attached to the extension of this system of precise triangulation as a contribution to the more perfect discussion of the size and shape of the earth is its immediate usefulness in providing reliable points of reference for the more detailed geographical surveys that are continually being carried forward by private and Government organizations.

The Coast and Geodetic Survey has been for some years carrying forward a magnetic survey of the United States under very able administration, and much practical good has already been done in the establishment of meridian lines for the use of surveyors in every part of the country, and in forestalling litigation and in paving the way for the orderly conduct of isolated compass surveys. Fixed magnetic observatories have been established in different

sections of the United States and in the outlying dependencies, where a continuous registry is made of the variations in the values of the declination and inclination, and of the intensity of the earth's magnetic force; and the foundation has been laid for the collection of a vast store of observational data, which, when studied in connection with the investigations of geologists and astronomers, promise to lead to important advancements. The Report contains a map showing the magnetic observation stations that were occupied up to 1903 in the United States, and gives an exposition of the observations that were made from July 1, 1902, to June 30, 1903. The Report also indicates that extensive part was taken by this organization in locating both international and interstate boundaries.

Turning from these extensive and important activities in the interior of the country to the harbours of the seaboard and the extensive coastal waters through which so much of the world's commerce approaches our shores, it is seen that the Survey was active during 1903, with twelve surveying vessels and a large number of skilled men in the prosecution of marine hydrographic operations, for the production of charts and sailing directions, for the benefit of commerce and navigation and the safeguarding of the lives of seamen. These operations, excepting the preparation of coast pilots, were not prosecuted extensively on the coasts of the United States, because our Atlantic, Gulf, and Pacific coasts have been almost completely surveyed, and the resulting charts can be kept correct for the use of mariners by the incorporation of the results of harbour surveys made by the army engineers, and with isolated surveys here and there in localities where change or development has rendered resurveying necessary; but in the coastal waters of the Philippines, of Alaska, and of Porto Rico a great deal was accomplished in charting what was before unknown.

The coasts and harbours of Porto Rico, one of the oldest colonies in the Western Hemisphere, were very inadequately known in 1899. They have now, for the most part, been fully surveyed and charted for purposes of navigation. In the Philippines, in addition to a large extent of littoral triangulation in Luzon and the exact determination of the geographical positions of many important points and places in Luzon and other islands, San Bernardino Strait, the most important gateway leading into the archipelago from the Pacific Ocean, and other neighbouring parts concerning which the need of marine hydrographic information was much felt, were surveyed and fully charted to the satisfaction of navigators.

The most important step that was taken with reference to the survey of the Hawaiian Islands consisted in the determination of the longitude of Honolulu with reference to San Francisco, by the transmission of telegraphic time signals through the submarine cable lately completed by the Pacific Commercial Cable Company between California and the Island of Oahu. The important national interests in the Territory of Alaska, with the supervision and development of which this organization is charged, were not neglected during the period covered by the Report; for, besides taking a weighty part in the preparation of the data that were submitted to the Tribunal which made the Alaskan boundary award, four well-equipped surveying steamers were employed in astronomical, hydrographic, and topographic operations in Bering Sea, and in Icy Strait, Davidson Inlet, Controller Bay, and Prince William Sound.

L.

GEOGRAPHICAL RECORD.

AMERICA.

VALPARAISO'S HARBOUR TO BE RENDERED SAFE.—*El Puerto de Valparaiso*, just published in Chile, contains the report of the Commission appointed to investigate the plans of Mr. Jacob Kraus, a Dutch engineer whom the Chilian Government had employed to prepare a plan for safeguarding the harbour. Valparaiso is the leading Pacific port of South America; but its splendid deep-water bay has the disadvantage of opening wide to the sea, so that hurricanes and great storms enter it. In the past eighty years 378 vessels in the harbour were destroyed by storm. A year ago the passenger ship *Arequipa* foundered in the bay, with 100 souls. Mr. Kraus reported that on account of the depth of water it was impracticable to build a sea-wall across the wide entrance to the bay. His improvement contemplates the construction of basins and sea-walls along a part of the water front of sufficient capacity to accommodate all the shipping. The Commission examined the topographic, geological, technical, financial, and other conditions of the work, and, with some minor modifications, the plans of Mr. Kraus have been adopted. The cost of the improvements, including a dry dock, is computed at $10,950,000. It is estimated that the tax on tonnage, together with the rentals of yards, sheds, and warehouses, will yield an income of $793,800, and that the improvements will

save the trade of the port fully $1,000,000 a year. The report of the Commission will be submitted by the Government to the Congress at its coming session, with the recommendation that the plans and specifications be adopted, and an appropriation be voted for the cost of the work.

DICTIONARY OF ALTITUDES IN CANADA.—Mr. James White, Geographer of the Department of the Interior, Canada, has prepared a "Dictionary of Altitudes in the Dominion of Canada," which is to be accompanied by a relief map of the Dominion on a scale of 100 miles to an inch. The list of elevations covers 143 pages. The latitude and longitude, taken from the latest maps and charts, and the authority for the figures of elevation are given with each locality. The list is not presented as absolutely accurate, but as the best interpretation of conflicting evidence available at the present time. The work is supplementary to the earlier volume, "Altitudes in Canada," which will doubtless be found more useful for the purpose of civil engineers; but the present book, with its alphabetical arrangement by provinces and territory, is more convenient than the other for the general public. Any one, for example, desiring to find the altitude of a railroad station, and ignorant of the name of the railroad line on which it is situated, may readily turn to it.

AFRICA.

A WATERWAY FROM LAKE CHAD TO THE ATLANTIC.—Capt. Lenfant has returned to France after the successful achievement in West Africa of a very arduous undertaking. He has proved that the long-conjectured through waterway between the Benue tributary of the Niger and the Logone-Shari River system emptying into Lake Chad really exists. He has thus established direct communication between Lake Chad and the Atlantic, though unfortunately the conditions are such as greatly to modify its value for transportation. His journey was up the Benue River on a small steamer to the Mayo-Kebbi, which he was the first to ascend above Bifara. The current became quite rapid in the upper part of the Mayo-Kebbi, and at the village of Lata, about fifty miles above Lere, he found that the river runs in a deep gorge with precipitous walls, where its course is broken by rapids and falls. Only 13 miles east of the point where his progress was impeded is the depression of Tuburi, bordering the water-parting between the Chad and Niger systems. But the Tuburi depression is 360 feet above his halting-place at Lata, and the upper Mayo-Kebbi leaves the lake in the

Tuburi depression and reaches Lata by a series of rapids and three cascades, which form the fine falls of M'Burao.

Of course the existence of these falls and rapids made a portage necessary. Capt. Lenfant took his boat to pieces, and porters carried it in sections to Gurunsi, on the Tuburi. Here the boat was put together and navigation was resumed. The Tuburi is an extensive marsh, with banks about 16 feet in height. It has a length of 65 miles, and is covered with pools and grassy plains, upon which rice is cultivated. Between the Tuburi and the Logone River lies a depressed area, from a mile and a quarter to two miles in width and about 13 miles long, which resembles a narrow park with grassy swards, trees, and villages. This is the water-parting between the two great river systems. At one side is a feebly-marked river bed covered with pools and water holes, connected by stretches of shallow water and partially overgrown with vegetation. When the expedition reached this point the period of high water had passed, but from the water mark they decided that the maximum depth had been 4.52 feet. The period of highest water usually lasts for six weeks, from Aug. 15 to Oct. 1, and during this time vessels drawing three feet of water may pass without difficulty; while for a further period, from July 20 to Oct. 25, navigation is possible for vessels drawing two feet.

The object of this expedition was primarily economic. At present France transports its supplies for the French stations on and near Lake Chad by the long and enormously expensive route of the Congo, Mobangi, and Shari Rivers. The cost by the route is about 2,000 francs a ton. Capt. Lenfant says that by the route he has discovered the transportation of supplies should take only sixty-nine days, as against the five months which the Congo route involves, and that the cost of transport would be reduced to 500 francs per ton. By the longer route the loss in deterioration of commodities is about one-half; while, according to Capt. Lenfant, it would only be about 1 to 2 per cent. by the shorter route. Of course freight would have to be transshipped around the gorges of the upper Mayo-Kebbi; but the greatest disadvantage would be that the route would be available for only about four months in the year. It was Lenfant who succeeded in carrying an enormous quantity of supplies through the rapids of the middle Niger where the river was thought to be unnavigable; and he is likely to be entrusted with the work of practically testing the availability of the new water connection he has discovered.

GIVING EGYPT ALL THE WATER IT NEEDS.—The Society has received from Sir William Willcocks, late Director-General of Reservoirs in Egypt, a copy of his lecture delivered before the Khedivial Geographical Society of Cairo on January 16, in which he discusses his plan for supplying Egypt with all the water required for its perennial irrigation. Egypt has a total irrigable area of 6,250,000 acres. Of this area, 250,000 acres, along the edge of the desert, are now and must continue to be inundated in flood, to prevent the sands of the desert from spreading over the Nile valley. Four million acres are perennially irrigated. Of the remaining 2,000,000 acres, two-thirds are irrigated only in flood, and one-third is not irrigated at all. The problem is how to provide perennial irrigation to these 2,000,000 acres, and so add £60,000,000 to the wealth of the country.

To give all the agricultural lands perennial irrigation, Egypt requires reservoirs capable of storing four milliards of cubic metres of water.

The Assuan reservoir, at its present level, contains one milliard of cubic metres of water, which will suffice for the conversion of 500,000 acres to perennial irrigation. But though the dam was only completed at the end of 1902, the whole of the water is already devoted to special tracts, and the Government is compelled to refuse all applications for water; and yet the provision of the remaining three milliards of water is well within the competence of the country.

Sir William sums up the financial situation of the Government to show that it will be justified in incurring the expenditure for this improvement.

When he designed the dam at Assuan he provided that it should be so built that it might be raised six metres in height and hold up another milliard of cubic metres of water. The cost of this improvement would be £500,000. The projected Wady Rayan reservoir would be well able to supply the two remaining milliards of cubic metres of water when working in conjunction with the Assuan reservoir thus improved. The Wady Rayan, where it is proposed to build this reservoir, is a depression in the desert to the south of the Fayum, and southwest of Cairo. When the Assuan reservoir is made capable of supplying two milliards of cubic meters of water, it will be possible to utilize the Wady Rayan reservoir to its fullest capacity. Working together, the two will easily provide all the water needed for the perennial irrigation of Egypt.

THE CAPE TO CAIRO RAILROAD.—The Cape to Cairo Railroad, it was announced in March, would be completed in April this year to the Zambezi, and the first through train, from Cape Town to the Zambezi, would be despatched from Cape Town late in April or early in May. On the first of February the track had been extended northward to within 77 kilometres of Victoria Falls, and preparations were beginning for the building of the large iron bridge that is to cross the Zambezi at that point. A part of this structure is now on the way to South Africa, and the remainder will be shipped as soon as possible. It is hoped to complete the bridge before the end of the year. The present contract will be completed when the road is extended to Victoria Falls and the bridge is in place. The building of the next section, from the Zambezi northeast to Broken-hill, 563 kilometres, will begin at an early day.

WHITE POPULATION OF THE CONGO FREE STATE.—On January 1, 1903, the Congo State contained 2,365 foreign inhabitants, of whom 1,417, or more than one half, were Belgians. The other foreigners were: 149 Italians, 136 Swedes, 119 Britons, 108 Portuguese, 104 Dutch, 67 Germans, 52 Swiss, 42 French, 41 Americans, 36 Danes, 27 Norwegians, 12 Russians, 8 Austrians, etc. The districts containing the largest number of whites were Boma, 447; Stanley Pool, 306; the Eastern Province, 285; districts of the Lualaba-Kasai, 208; the Equator, 205; Matadi, 184; the Welle-Makua, 174; Bengala, 148; the Cataracts, 132.

NAVIGATION IN KATANGA.—*Le Mouvement Géographique* (No. 15, 1904) publishes the first part of the results of investigations by Mr. Lattes, who has been studying the question of the navigability of the Lualaba and its tributary, the Lufira, for the Special Committee of the Katanga. He reports that the Lualaba is navigable for steamers from Konde Rapids (about 9° 10′ S. Lat.) to the Dia rapids (about 5° 20′ S. Lat.), a distance of about 640 kilometres. In this long stretch there is no serious impediment to navigation, except that it is a little difficult at high water where the river emerges from Lake Kisale. The population along the banks between Konde Rapids and Lake Kisale is very dense. From Nyongo to Katowe an uninterrupted series of villages and plantations lines the banks, so that it will be difficult to procure wood for ths steamer furnaces. The natives of this region are unspeakably lazy, and it will not be easy to arouse them from their habit of almost complete idleness. The lower Lufira is navigable for steamers for 54 kilometres above Lake Kisale, but only during a part of the year.

ZOOLOGICAL COLLECTIONS IN AFRICA.—Cairo is one of the most important entrepôts for the collection of wild animals. The *Report* of the Public Works Department in Egypt for 1902 says that during that year the staff of the Giza Zoological Gardens were intrusted with bringing 90 live animals from the Sudan to Giza, including specimens for the Khedive and foreign zoological gardens. The animals included 10 lions, 4 leopards, 7 cheetahs, 4 giraffes, 11 antelopes, 2 Nuer cattle on the upper Nile, 1 antbear, 11 smaller mammals, 5 secretary birds, 3 shoebills, 17 storks, cranes, geese, etc., 7 tortoises, and 1 crocodile. Out of the 90 animals, 88 reached Giza in safety. The only accidents on the journey were the loss of a fine young roan antelope and a gray crane, which had been purchased in Khartum for the Giza Zoological Gardens, but died suddenly near Berber on an exceptionally hot day in May. The animals sent on from Egypt to the London, Dublin, Calcutta, and Pretoria Zoological Gardens all reached their destination in safety, except the antbear, which died at Marseilles on the way to London.

ASIA.

THE LOWER YALU RIVER.—The valley of the Yalu is now attracting wide attention, because the armies of Japan and Russia are marshalled in its neighbourhood. Mr. Robert T. Turley gives some description of the river in the April number of the *Geographical Journal*. The lower part of the river is several miles in width and the water rises and falls thirty feet at spring tides. The sand banks at low-water stretch for miles, and ships rest on them while their crews play cricket and other games. On account of ice, ships cannot enter the river from November 30 to the middle of March. On the Manchurian side, near the river mouth, is Tatung Ku, a wretched, dirty, low-lying town on a creek some distance from the river. It was utilized as a port before nearly all the sea trade was transferred to Antung, recently made a treaty port, ten miles further up the river. Both these towns stand only a little above sea-level, and have much sickness, as the water is scarcely potable. Antung is a thriving town of about 20,000 inhabitants, doing a large import and export trade with sea-going junks. It has a well-built Bund and a landing-place with a Custom-house. A few miles further up the river is Chiu Lien Cheng, a small village formerly of more importance, where the imperial road and the telegraph line from Mukden cross the Yalu and extend southward to Seul. Across the river is some of the richest grain land in Corea; and up the river a short distance is the dilapitated old Corean city of Wiju,

once a famous political and trading centre. The Yalu narrows above Wiju, and is confined by hills, but is navigable for large junks up to the mouth of the Hün Chiang. Sailing up river, however, is rather slow work, as the current is usually strong. On the Corean side the hills are more or less parallel with the river, with valleys enfolding villages. On the Manchurian side numberless short valleys come down to the river roughly at right angles. These valleys are fairly wide, and cultivated. Trade is carried on along the river by mule cart or sledge in winter and in summer by shallow junks, which ascend for more than 200 miles in a direct line from Antung.

Water from Clouds on Table Mountain, South Africa.—In a recent number of the *Transactions of the South African Philosophical Society* (Vol. XIV, Pt. 4) there are presented some interesting facts concerning the supply of water which comes from the clouds over Table Mountain. The rainfall of this district is at a maximum in winter, only about eight per cent. of the annual precipitation coming in the three summer months (December to February). Sometimes two months may pass by at that season without a trace of rainfall. The vegetation, as a whole, is of a character which is adapted to a dry climate, but on the summit of Table Mountain itself plant life is notably more luxuriant. The reason for this is found in the fact that a supply of water comes from the clouds, which, during the southeast winds of summer, sometimes cover the upper portions of the mountains for a considerable length of time. Droplets of water from the clouds are then deposited on the plants, and the quantity of water thus collected may be considerable, as has been shown by actual measurement. This, it is to be noted, is not a case of a production, or of an increase of rainfall because of the presence of the vegetation, but simply a case of collecting water-drops which already exist in the atmosphere.

A similar phenomenon on Green Mountain, on the Island of Ascension, has been described by Professor Cleveland Abbe. The principal water supply of the naval station on the island comes from the summit of the mountain, several miles away. The upper portion of Green Mountain is covered with vegetation, and nearly all of the water on the summit comes from slight showers and the steady dripping from trees which are enveloped in the clouds. These trees, as in the case of the vegetation on Table Mountain, simply mechanically collect the water-drops which are produced from the condensation of the water vapour in the ascending, cooling air.

R. De C. W.

EUROPE.

RELATIONS BETWEEN PRECIPITATION AND FLOW-OFF IN THE BASIN OF THE MAIN RIVER, GERMANY.—A paper with this title, presented by Maximilian von Tein at the Ludwig–Maximilian University of Munich, presents the following conclusions as the result of his observations: The annual precipitation above Miltenberg, comprising all but a small part of the Main basin, reached an average, in the twelve years, 1886–1897, of 13,700 millions cubic metres. The maximum rainfall occurred in July, with 1,690 million, and the minimum in February, with 760 million cubic metres.

The average annual discharge or flow-off of the Main at Miltenberg reached 3,900 million cubic metres. The greatest quantity was in March, with 650, and the smallest quantity in August and September, with 190 million cubic metres. Between March and May there is a rapid decrease in the discharge.

Precipitation and flow-off are not parallel. The maximum precipitation (July) is received at a time of comparatively small discharge; the largest flow-off (March) at a time of not very important precipitation. Fifteen to twenty per cent. of the underground water is used by vegetation, and at least 30 per cent. in fall and winter (October to December) is retained in the ground. The water thus reserved in fall and winter forms a resource which is utilized gradually in the following year, and particularly in the drier period, from August till September. The stand of water in the Main, in both these months, depends largely upon the amount of precipitation in the previous winter.

THE METEOROLOGICAL ASPECTS OF BIRD MIGRATION IN THE BRITISH ISLES.—For several years past (since 1880) the British Association, through a committee, has been carrying on an inquiry concerning the migration of birds in Great Britain and Ireland, the results of which are briefly summarized in *Nature* for March 31. Among the most important conclusions are those which concern these migrations in their relation to meteorological conditions—a subject which has never been sufficiently investigated. It appears that in the autumn the great arrivals of migrants from northwestern Europe are correlated with a type of pressure distribution which gives fine weather over the North Sea between Scandinavia and the British Isles; but, although this fine weather prevails at the point of departure, and hence induces the migration, it may not extend as far as Great Britain. In this case the birds have to pass through more or less unfavourable weather before they reach their

destination. A study of the conditions during which birds cross the English Channel showed that no migrations occurred when the weather was at all unfavourable, but that the *direction* of the wind was not a controlling factor. No movements were performed with wind velocities over about 28 miles an hour. When the wind blew 34 miles the few birds observed were in distress. At higher velocities, approaching 40 miles an hour, the only birds observed were martins and swallows. The supposed influence of wind direction in inducing migration is believed to have been misunderstood. Wind direction, of course, depends on the distribution of pressure; but the pressure type, by producing favourable or unfavourable weather conditions, is the prime factor. R. DEC. W.

POLAR.

THE FATE OF BARON VON TOLL.—According to a letter from Baron von Osten-Sacken to the *Geographical Journal* (April, 1904), hope of the return of the Russian Arctic explorer, Baron von Toll, had not been given up late in February, and rewards had been offered by the St. Petersburg Academy of Sciences for the discovery of the missing men, or of definite traces of them. The announcement of the Academy is as follows:

"Baron Edward Toll, leader of the polar expedition, organized by the Academy of Sciences, left Bennett Island in a southerly direction on Oct. 26 (Nov. 8), 1902. He was accompanied by the astronomer Seeberg and by two Yakuts, Vassily Gorokhov, surnamed Chichak, and Nicholas Protodiakonov, surnamed Omuk. All these persons appear to have been carried away by the ice in an unknown direction. The attempts hitherto made for their succor having remained without result, a reward of 5,000 rubles will be given by the Academy to any person or persons who may discover the expedition, either in whole or in part; and a reward of 2,500 rubles for any incontestable indication of traces likely to contribute to the success of the search."

The *Novosti* of March 15, on the other hand, contains a letter signed Woldemar von Toll, in which the gloomiest view is taken of the fate of the baron and his companions, who, the writer thinks, must have perished in the Arctic deserts.

The *New York Tribune*, of April 22, published the following telegram:

St. Petersburg, April 21.—The last document left by Baron Toll has been found by Lieutenant Kolchak. It is dated at Paul Keppan Bay, Bennett Island, November 11, 1902, and is as follows:

Accompanied by Astronomer Seeberg and two traders, I left the winter quarters of the Zaria, in Nirpich Bay, on June 7. We proceeded by the northern shore of Kotelnyi and Thaddeus islands to Cape Vysoki, and on July 13 we headed for Bennett Island. The ice was rather broken on July 25, and we prepared to take to two baydars, native boats. Here we killed the last of our dogs.

The icefloe on which we camped carried us in four and a half days forty-eight miles on our course, but bearing off, we left it on July 31, crossing the remaining twenty-three miles to Bennett Island on the baydars, landing on August 3 at Cape Emma.

The document includes the results of the astronomer's survey of Bennett Island, which is shown to be an offshoot of the Central Asian plateau. It is composed of the oldest Cambrian strata, broken by outflows of basalt, which cover brown coal measures.

The remains of coniferous vegetation and the bones of mammoth and other quaternary animals were seen in the valleys. White bear and walruses and a herd of thirty reindeer were found, and the birds seen were gulls, eagles, falcons, and flocks of geese.

The conclusion is in these words:

Owing to the fog we could not see the land whence the birds came nor distinguish Sannikoff Land. We are leaving a number of recording photographic instruments and start for the south, provisioned for from fourteen to twenty days. All are well.

We are in 76 degrees 38 minutes north; 149 degrees 42 minutes east.

BARON E. TOLL.

EDUCATIONAL GEOGRAPHY.

A SCHEME OF GEOGRAPHY.—The exact meaning of the word "geography" and the content of the subject in elementary and secondary schools and universities, as determined by the needs of education and the meaning of the word, have long been under discussion. From ten to fifteen years ago much space was devoted to the topic "What Is Geography?" in the educational papers of the country. Since that time has come the modern awakening in geography teaching, with its many faddisms and its new and inspiring suggestions. In our enthusiasm, especially in elementary school work, we have in many cases lost sight of geography itself in our undue emphasis on certain phases of the subject as a whole. In our secondary schools and colleges the tendency toward subdivision has been even greater, until now there is hardly an university course in geography in the country, though there are very many in the subdivisions physical geography, meteorology, climatology, commercial geography, etc.

Many teachers have regretted this undue insistence upon the parts of geography, as though any part were greater than the

whole. In a recent article* Professor Davis has brought our thought back to the time-honoured subject of the meaning of geography, and the relation of its parts, and has done the cause of geographical education a great service. This article deserves careful attention not only from teachers, but from all interested in the cause of geography. The author recognizes that we have classified the causal or environmental side of geography with fair success, but that we have not paid sufficient attention to the consequential side, or to the relations between consequences and causes. He has proposed that we use the term *ontography* to include the field of organic responses to physical environment, and has suggested a means of classifying ontography, so that this field may in course of time be classified as thoroughly as the physiographic side is classified now. This is the field in which the larger amount of work remains to be done; this is the neglected phase of the subject which has been considered fragmentally hitherto, but which has never been organized. It is to be hoped that this renewed emphasis of the relations of geography may continue to occupy our thoughts and attention, and that geography as a whole may thereby profit greatly.

R. E. D.

A Neglected Phase of Commercial Geography.—It is an interesting fact that, in all our exploitation of the nature and importance of commercial geography in education within the last five years, there has been a singular neglect of an extremely complicated but necessary side of the subject. Every text-book has insisted strongly on the physical controls of commerce, and some attention has been given to the effects of religion and language upon trade. Only scattered attention has, however, been given to the political economy of the subject. The causal elements involved in a study of commerce are the physical factors on one side and the human factors on the other. To give a true understanding of present commerce without taking into account the fiscal policy and the financial conditions of a country, or many phases of economics, some of them extremely minute in character, that influence a business man daily, is to neglect the side that may at times overturn all climatic and physical controls. This is undoubtedly a difficult subject to present to secondary pupils, but it must be done before commercial geography can be considered well or adequately presented.

R. E. D.

* A Scheme of Geography, *Geographical Journal*, October, 1903.

EDUCATIONAL GEOGRAPHY AT THE EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS.—The work in Educational Geography in this country has not hitherto been co-ordinated in such a way that the workers in one field necessarily knew the relations of their own work to that of their colleagues in the lower or higher schools. An opportunity for such an interchange of ideas will be given at the Eighth International Geographic Congress next autumn, and it is to be hoped that all teachers of geography, especially teachers in secondary and normal schools, and in universities, may co-operate earnestly to this end. Particular attention will be given to Educational Geography at the several sessions of the Congress, and experienced teachers are cordially invited to contribute to the programme. Papers must be limited to a length of twenty minutes, and, if possible, of twelve minutes; and must be approved by the programme committee. All who desire to take part should communicate at once with Professor Richard E. Dodge, Teachers College, Columbia University, New York City, stating the topic of the proposed paper and the time allowance desired. A brief abstract should accompany the application, if possible.

R. E. D.

OBITUARY.

SOPHUS RUGE.—Prof. Sophus Ruge, the eminent German geographer, died at Dresden on Dec. 23, 1903. Geography was his favourite study from boyhood. Graduating from the University of Göttingen in 1857, he became a teacher, and after 1859 resided at Dresden, first as a teacher in a commercial school, and since 1874 as Professor Ordinarius of geography and ethnography at the Polytechnicum. He wrote two excellent text-books, which passed through many editions. But he was best known for his labours in connection with the history of geography. Among his numerous papers were: "Über Compass und Compass Karten," Dresden, 1868; a second edition of Peschel's "Geschichte der Erdkunde," 1877; "Geschichte des Zeitalters der Entdeckungen," Berlin, 1888; twelve "Abhandlungen und Vorträge zur Geschichte der Erdkunde," Dresden, 1888; "Life of Columbus," 2nd Edition, Berlin, 1902; an historical essay on the cartography of America, published as a supplement of Petermanns Mitteilungen; a paper in the Festschrift of the Hamburg Geographical Society on the discovery of the New World; the article on cartography in the Encyclopædia Britannica; and bibliographical reports in Wagner's Jahrbuch.

GENERAL.

GEOGRAPHISCHER ANZEIGER.—This publication, now in its fifth year, issuing from the house of Justus Perthes, Gotha, will hereafter be completely identified with the interests of geographical education. It appears in a new and very neat dress, and the subscription price for the twelve numbers of 1904 is 6 marks. It treats of such phenomena as the wearing away of the Baltic coast of Germany by wind, rain, and other agencies, in language that adapts the matter for class-room reading. Geographical news of the day, such as the report on the sand-buried ruins of Khotan, are told from the point of view of the school. Thus portions of the magazine are adapted for the student, while other parts are especially meant for the teacher. The concise book reviews, and, in fact, all the departments are full of hints and suggestions that many teachers will be eager to utilize.

DISTRIBUTION OF THE YELLOW FEVER MOSQUITO.—Dr. Howard has written a brief report on the geographical distribution of the yellow fever mosquito, which is published by the United States Public Health and Marine Service. He records the various localities where the mosquito has been met, and draws the conclusion that it may be expected to be present in all regions whose climate is not too dry, between latitudes 38° N. and 38° S., in which the sum of the daily mean temperature above 43° F. amounts to 18,000° F. for the year.

RIDDING ISMAILIA OF MOSQUITOES.—The Liverpool School of Tropical Medicine reports (Memoir XII) that in 1892 Major Ross went to Ismailia, on the Suez Canal, at the invitation of the Canal Company, to suggest a method of ridding the town of mosquitoes. He advised filling in the marsh land, flushing and cleansing the drainage channels weekly, and also petroleum treatment for drains and waste water that does not soak away. Prof. Boyce has just reported that as a result of this campaign the mosquitoes are now no more abundant in Ismailia than in Paris. Cases of malaria have also diminished from 1,555 in 1902 to only 209 in 1903. These gratifying results have been accomplished by an expenditure of $22,000 in the initial cleansing operations; and it is estimated that the annual outlay will not be more than $3,600.

LENGTH OF QUATERNARY TIME.—As a result of studies in the Kern Basin region of the Californian Sierras, Lawson (Bull. Dept. Geol. Univ. of California, Vol. 3, 1904, pp. 291–376), makes an

estimate of the length of the Quaternary time as 2,751,000 years. This estimate is based upon the division of the Quaternary period into four parts, and the establishment of ratios for the work performed in each division. The time since the disappearance of the glaciers is taken as 1; the Glacial Period as 50; the period of cañon-cutting 300; and the time required for the development of the broad high valleys as 2,400. Assigning to the post-glacial time 1,000 years gives to the Quaternary time the startling length in years above stated. There are few, if any, geologists who would accept this estimate as of any particular value; indeed the author's own statement leads one to believe that he places little value on it, and has merely allowed himself to indulge his fancy in a speculative calculation. He states that "he has ventured to make a guess," and that the figures "have not much value." Nevertheless the newspapers of the country have gravely printed his results as if they were established. R. S. T.

Two New Physiographic Terms.—With the development of a new science nomenclature becomes necessary, and it is for this reason that as a result of the scientific study of the evolution of land-forms a large number of new physiographic names have been proposed in the last few years. Many of these names have survived and attained a permanent place in geographic nomenclature; still more have gasped at birth, and then passed into oblivion. Lawson (Bull. Dept. Geol. Univ. of California, Vol. 3, 1904, pp. 391–376) has just proposed two additions—*kernbut* and *kerncol*—to the list. A kernbut is a butte-like hill, or a buttress, on the cañon side, occurring typically in Kern Cañon, California; it is separated from the cañon wall by a low sag or col, the kerncol. The origin of these land-forms is fully discussed by Lawson, and in the case of the occurrences in the Kern Cañon they are assigned to rifting of the granite, opening fissures. R. S. T.

Annual Awards of the Royal Geographical Society.—The Council of that Society awards the Founder's Medal this year to Sir Harry Johnston for the many valuable services he has rendered during over twenty years towards the exploration of Africa, West and East, North and Central; the Patron's Medal is awarded to Commander Robert F. Scott, R. N., leader of the British Antarctic Expedition, especially for his great sledge journey to 82° 17′ S.; the Murchison Grant is awarded to Lieut. Colbeck for his admirable conduct of the Antarctic relief expeditions; the Gill Memorial to

Capt. Irizar of the Argentine Navy for his successful relief of the Swedish Antarctic Expedition; the Cuthbert Peek Grant to Don Juan Villalta for important exploring work to the east of the Andes, and the Back Grant to Dr. M. A. Stein for his valuable geographical work in Central Asia.

WIND-BLOWN TREES.—Among the many simple non-instrumental meteorological observations which travellers may make, perhaps none is of more general interest and value than those which concern the unsymmetrical growth of trees under the action of the prevailing winds. A recent illustrated paper on the subject of wind-blown trees, by Professor M. S. W. Jefferson, appeared in the *Journal of Geography* for January last, and a very complete study of the whole matter, by Professor J. Früh (Die Abbildung der vorherrschenden Winde durch die Pflanzenwelt), has also recently been published (*Jahresber. geogr.-ethnogr. Gesell. Zürich, 1901–02*), with a full bibliography. Here is a brief summary of Professor Früh's monograph:

The unsymmetrical growth of trees may be ascribed to a number of factors, among which the following are of the greatest importance: 1. The exposure, as in valleys, on slopes, ridges, plains, etc. 2. The nature and condition of the soil, upon which the stability of the trees so largely depends. 3. The stage of development of the trees, *i. e.*, the influence of the roots, the size, distribution, and number of the leaves. 4. Secondary conditions, as the weight of snow or ice on the trees; the removal of some protection, as through deforestation, and the like. Trees grow unsymmetrically when they receive light from one side, or when they are habitually overloaded on one side with snow, hoar frost, or creepers, and also, and very largely, under the mechanical or physiological effect of wind. With the mechanical effects may be combined the chemical effects of frost, which injures the leaves, while physiologically the effect is one of desiccation.

The general effects of prevailing winds upon trees may be classified according to the different forms produced, as follows: 1. Vertical trunk, but absence of branches on the windward side of the tree. 2. Top of the trunk inclined in the direction of the prevailing wind, the crown being unsymmetrically developed. 3. Trees very much inclined, the branches being almost one above the other. The size of the trees decreases towards the windward side of the forest. 4. Trunk and crown may be deflected in different directions, the trunk being turned by strong but temporary winds, while the

crown shows the direction of the prevailing winds. These effects are all seen chiefly in districts bordering the ocean. The different type-forms of wind-blown trees are illustrated by means of a sketch (Fig. 3, p. 24), and the kinds of trees most susceptible to this influence are noted (pp. 28–30).

A large portion of this excellent report deals with the results of observations made in different parts of the world on trees which have grown unsymmetrically under the influence of the general winds, and also under the control of local winds, such as the föhn, mistral, bora, and mountain and valley breezes. Taken as a whole, Professor Früh's study is a noteworthy contribution to the *living* side of climatology, and it will doubtless turn the attention of travellers to the observation of trees as wind vanes. Such an investigation as this cannot fail to enliven the study of local climatology. Everything that concerns the relation of atmospheric conditions and life, whether animal or vegetable, deserves more attention than it has hitherto received. R. DEC. W.

PERSONAL.

Prof. Dr. Joh. von Ranke, of the University of Munich, has been elected an honorary member of the Swedish Anthropological and Geographical Society.

Prof. A. Philippson, of Bonn University, who has given much time in recent years to geographical and geological investigations in Greece, will engage, during the coming summer, in explorations in Asia Minor, using the Wentzel–Heckmann grant of the Berlin Academy.

Prof. Robert Koch, who has been visiting Dar es Salâm, the capital of German East Africa, studying malaria and the prevalent cattle disease, will return to Berlin at the end of June.

M. Gentil, the well-known African explorer, has been appointed Commissioner-General of the French Congo territory under the new administrative régime, dividing the vast region into four districts for more effective and economical government. His headquarters will be at Brazzaville, whence he will administer the affairs of the middle Congo, and have supervision over those of the other districts.

THE U. S. GEOLOGICAL SURVEY, at the request of the Peruvian Government, has sent Dr. George I. Adams to Peru to organize a service for hydrographic work.

NEW MAPS.

AMERICA.

ARGENTINA.—(1) Bahia Camarones, scale, 1 : 40,000, or 0.6 statute mile to an inch; (2) Puerto Santa Cruz, scale, 1: 50,000, or 0.7 statute mile to an inch; (3) Rio Chubut from its mouth to Rawson, scale, 1: 25,000, or 0.39 statute mile to an inch; (4) Bahia Vera, scale, 1: 20,000, or 0.3 statute mile to an inch. Hydrographic Office, Buenos Aires.

These charts are examples of the fine survey and map-work the Hydrographic Office of Argentina has been producing in the past four years of the various ports along the coast of Patagonia. The geographical co-ordinates are not indicated on the margins, but are given for one point on each sheet. The magnetic variation, numerous soundings, and somewhat minute delineations of the coasts are shown.

THE UNITED STATES.—Geologic Atlas of the United States.

No. 97. Parker Folio, South Dakota. Area, 871 square miles between parallels 43° and 43° 30′ N., and meridians 97° and 97° 30′ W. It is almost wholly prairie, with a few groves near the larger streams. Drift covers the entire surface except the alluvial flats in the larger valleys and scattered exposures of older rocks. Permanent springs are rare, lakes receive their water directly from rainfall and most of them are not permanent. Owing to the importance of obtaining water from below the surface by artificial means an artesian water sheet is included in the folio. No mineral ores or coal have been found. The soil is generally fertile, a black loam and easily tilled.

No. 98. Tishomingo Folio, Indian Territory. Area, 986 square miles, between parallels 34° and 34° 30′ N., and meridians 96° 30′ and 97° W. It is in the southeastern part of the Chickasaw Nation. The mineral resources are asphalt, granite, limestone, and clay. The soils range from an almost barren stony soil fit only for grazing, to the most fertile river bottom and black marly upland.

AFRICA.

PORTUGUESE WEST AFRICA.—Provincia de Angola (Eight Sheets). Scale, 1:1,000,000, or 15.7 statute miles to an inch. Missões do Espirito Santo. Supplemento da Revista *Portugal em Africa*, 1901.

This black and white map includes not only the province of Angola but also the adjoining portions of the Congo Independent State and British Rhodesia as far east as the 25th meridian and as far south as the 18th parallel of south latitude. The topography is somewhat crudely drawn, but the savannas are quite sharply differentiated from the mountain regions. The complete railroad from Loanda to Ambaca is shown and also the route of the proposed extension to Malange and Cassange. The map is especially valuable because it gives so many place names, mission stations, overland routes, and other information. It is likely to be for some a most useful source of information concerning this large region in West Africa.

MOROCCO.—Reiserouten in Marokko des Grafen J. von Pfeil. Scale, 1:300,000, or 4.73 statute miles to an inch. Sheets I and II. Mitteil. der Geograph. Gesellsch., Vol. XXI., Jena., 1903.

This map is the result of Count von Pfeil's three journeys in Morocco in 1897,

1899, and 1901. The explorer's own determinations of the latitudes of nineteen places and his observations for the longitude of Fez enabled him to correct the positions assigned to important places on earlier maps. His routes extended from Tangier to Fez, from the City of Morocco to Rabat, and also covered large districts between these two large routes. In most places the nature of the country for several miles on either side of his path is indicated.

EUROPE.

BALKAN PENINSULA.—Wandkarte der Balkan-Halbinsel. (Sheets.) Scale, 1:800,000, or 12.6 statute miles to an inch. Designed and drawn by E. Kogutowicz. Hungarian Geographical Institute, Budapest, 1903.

The scale of this notable production is nearly twice as large as that of the finest atlas map of the Balkan Peninsula (Stieler's Hand-Atlas, 4 sheets, scale, 1:1,500,000). The map measures 112 by 136 inches; and the type is so large that it may conveniently be used as a wall map. The mountains are shown in wash colours—a process that never conveys exact information; but it is not yet advisable to use the most refined cartographic methods in drawing a map of the Balkans on so large a scale as 1:800,000, because the surveys of most of the peninsula are not sufficiently exact to justify their employment. The present surveys of a portion of the Peninsula rest upon a geodetic basis, and, of course, the processes employed in this map are not wholly adequate to represent the knowledge we have of them; but no better methods could profitably be used on so large a map for most of the Peninsula; and on the whole Mr. Kogutowicz has met with much success in a very difficult undertaking. It may be said for his plastic presentation of mountain features that a comparison of it with the results of the best surveys shows that his generalizations have been very carefully carried out.

The map is very clearly printed. The reviewer has observed no instance of illegibility; and the type in the mountain regions is as easily read as in other parts of map. As the map has a far more extensive nomenclature than any other yet made of the whole peninsula, its legibility is a great point in its favour. Excepting the boundary, the hydrography (blue), and the mountains (gray), only black is printed to show a great variety of information, including footpaths, passes, forts, and ruins. Many figures of heights in metres are given not only for mountains, but also for passes, valleys, rivers and places. In writing the names Croatian spellings are employed, excepting in Roumania and Greece, where the official orthographies are used. The map is a valuable addition to our facilities for studying the Balkan Peninsula.

AUSTRIA.—Touristen-Wanderkarte der Dolomiten. (Eastern Sheet.) Scale, 1:100,000, or 1.5 statute mile to an inch. By G. Freytag. G. Freytag & Berndt, Vienna, 1904. Price, paper, K2.40; linen, K3.60.

A folding tourist map of the eastern part of the Tirol, on a scale so large that the elevation contours, the important footpaths, as well as larger routes, the points presenting the finest views, the location of castles, inns, churches, crosses, monuments, ruins, Alpine huts, and many other minute details are given. The mountains are shown in brown, with the effect of relief, the glaciers in blue hair lines, and the contours (interval 100 meters) make it easy to determine the steepness of slopes. The Western sheet is soon to be published. The map will be useful not only for tourists, but also for all who wish to gain a better idea of the topographic aspects of this region than they are able to derive from atlas sheets of smaller scale.

FINLAND.—Geologisk Ofversiktskarta ofver Finland. Scale, 1:400,000, or 6.3 statute miles to an inch. Sheet. St. Michel. By the Geological Commission. Helsingfors, 1900.

The large variety of geological features is shown by a combination of colours and other symbols. The sheet embraces most of the western part of the Province of St. Michel, in the heart of the lake district, and covers 3½ degrees of longitude and 1½ degrees of latitude. The Observatory of Helsingfors is the initial meridian. The geological detail is minutely presented, and very clearly defined.

ATLASES.

STIELER'S HAND-ATLAS—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Lieferungen 29–30. Gotha, Justus Perthes. Price, 60 pf. for each part containing 2 map sheets.

The notable new map of Russia in six sheets is now completed. Sheet 48 includes the south-eastern part of Russia with the northern portion of Asia Minor and the eastern half of the Balkan lands. Contours of 20 to 1,000 metres show the conformation of the sea bed in the coastal and some parts of the deeper waters of the Black Sea. Sheet 49 outlines the coasts of the Caspian with greater detail than is commonly seen, gives some figures of elevation for the Manytsch depression, and shows the water-parting of its eastward and westward flowing drainage. It presents the entire region of the Caucasus and the Transcaspian territory as far as the Aral Sea. Sheet 76 (Australien und Polynesien) is also a new map on a scale of 1:30,000,000, or 473.4 statute miles to an inch. The Pacific is coloured to show the results of deep-sea soundings up to the present time. The name "Hawaii Inseln" is extended to cover all the islands, islets, and banks between the island of Hawaii and the Midway Islands, where we have a cable station. Four insets show the New Caledonia and Loyalty Islands and the Tongatabu, Marquesas, and Tahiti groups on a larger scale. Polynesia and the Pacific have been shown for many years in this atlas on two sheets with the smaller scale of 1:40,000,000, as a large part of each sheet was filled with insets of the more important groups. Sheet 82 (Nord-Amerika) is a revision by Habenicht of the map of our continent designed by Petermann for this atlas. The most important changes in the present revision relate to the topographic aspects of Alaska, the new islands discovered by Sverdrup in the American Arctic regions, and the contours of the sea floor both to the east and west of the continent.

BOOK NOTICES.

Précis de Géographie Économique. By Professors Marcel Dubois and J. G. Kergomard. Second Edition, revised with the assistance of M. Louis Laffitte. VIII and 837 pp. Index. Masson & Co., Paris, 1903.

This manual would make a desirable addition to the library of every teacher of economic geography who can read French. Each country is treated in turn, beginning with France, which occupies the first 152 pages. The physical and political geography of a country, its population, government, and administration, and the

leading influences of these factors upon economic development are first considered. Then follows an admirably clear and full though compact discussion of the agricultural, forest, and animal industries, with a résumé pointing to the deductions to be drawn from this array of facts. The manufactures are then treated in groups, according as they are based upon mineral, vegetable, or animal materials. Commerce is the closing topic of each chapter, and it is considered in respect of ways of communication, merchant marine, ports, domestic and foreign trade, and colonial relations. A paragraph at the close sums up the general conclusions as to the economic position of the country among the nations. The numerous statistics are given as footnotes under the matter to which they relate. The most distinctive feature of the book is the large number of well-selected facts, which are commented upon only when the deductions to be drawn from them are not exactly obvious. With only 31 pages given to the United States the treatment is too summary to compare favourably with that of the leading European countries.

Neapel, seine Umgebung und Sizilien. By Prof. Dr. Hippolyt Haas. 194 pp. 154 illustrations and a coloured map. Velhagen & Klasing, Bielefeld and Leipzig, 1904. (*Price, 4 marks.*)

This volume is the seventeenth of the series of geographical monographs which Velhagen & Klasing are issuing under the general title of "Land und Leute," edited by Albert Scobel. The region between Naples and Palermo, with many natural aspects remarkable for beauty and historic interest and numerous picturesque phases of human life, especially lends itself to the best qualities of the writer and the illustrator; and all who have seen earlier numbers of these series need no assurance that in "Neapel" Prof. Dr. Haas has supplied letterpress that is geographically accurate, vivacious, and readable, and that the 154 photographs are given in the best style of reproduction. A large number of the illustrations are full-page and some of them are double-page cuts, as the Panorama of Naples, the Greek Theatre near Taormina, and Capri. Under each picture the page on which the scene is treated in the text is mentioned.

In Search of a Siberian Klondike. By Washington B. Vanderlip and Homer B. Hulbert. xv and 315 pp. 47 half-tone illustrations and a map. The Century Co., New York, 1903.

Mr. Vanderlip, a mining prospector, made this journey through

the north-eastern part of Siberia between the Sea of Okhotsk and Bering Strait; and Mr. Hulbert, editor of the *Korean Review*, put the traveller's interesting experiences on paper. The Russians are very much alive to the value of mineral deposits, and Mr. Vanderlip was sent by a Russian company to look for gold. His travels of fourteen months convinced him that, though there may be some gold within the radius he covered, there are no extensive auriferous deposits on the streams flowing into the Okhotsk Sea, near its head, nor in the beach sands along the shore of Bering Sea clear to the Arctic Ocean. But if he did not find gold he travelled through a region not yet made commonplace by globe-trotters—the home of the dog and the reindeer Koraks, of the Tunguses and the Tchuktches. He lived and journeyed with them, and brought home a very interesting account of their characteristics and ways of living. His adventures were well worth telling, and they are capitally told.

He says the company that carries on a barter trade in this region makes from 100 to 1,000 per cent. profit. They pay from 50 to 150 roubles for a black fox skin that sells for many times those figures in Europe. The Tchuktches, he says, have a very friendly feeling for Americans, but are less well disposed towards the Russians, who try to make them pay tribute, while American whalers bring them barter goods.

The Philippines and the Far East. By Homer C. Stuntz. 514 pp. 87 illustrations, a map, a plan of Manila, and an index. Jennings & Pye. Cincinnati, 1904. (*Price, $1.75 net.*)

A Methodist Episcopal missionary wrote this book, but religious conditions and missionary effort in the Philippines are kept apart from the other matter, and occupy only about one-third of the space. The purpose of the book is laudable, and the author has been quite successful in fulfilling it. With the advantage of two years' work in the Philippines he has tried to give an unprejudiced and conservative view of the many elements that make up the people, of their actual condition and needs, and of the work and influence of our Governmental and private enterprises in the islands. Being able to bring an open mind and the right temperament to this task, he has written a book that is good to read. He describes the archipelago and its resources accurately, as far as our knowledge goes, though without any special geographic aptitude. One of the best chapters relates to our efforts to promote education and the work of the American teachers. Mr. Stuntz says that in every town where an American teacher has been at work more people

understand English than speak or understand Spanish(!). He adds that within ten years English will be the language for intercourse between the various races. It would not be easy to arrange and present more information about the Philippines, in the same space, than has been done in this book. Many of the illustrations are illuminative, especially those relating to the schools.

Cape Colony for the Settler. By A. R. E. Burton. ix and 355 pp. 29 half-tone illustrations and 8 maps. Issued by order of the Government of the Cape Colony. P. S. King & Son, London, 1903.

The author, editor of the *Transvaal Agricultural Magazine*, has filled this volume with a large amount of information about the geography, climate, resources, land laws, etc., of Cape Colony, together with descriptions of the urban and rural industries and the various lines of development. The work has been especially prepared for the guidance of those who may seek a home in Cape Colony, but the geographer will also find it very useful. Maps of the best quality show the rainfall and the numbers per square mile of sheep, goats, horses, cattle, and ostriches. The first part of the book treats of Cape Colony as a whole, including the Cape farmer and native labour, with separate chapters devoted to each of the larger industries of the country. In the second part each of the small divisions of the colony is separately delineated, so that if the reader requires more minute information about any particular section he may turn to it even without referring to the index, as the arrangement of these divisions is alphabetical. The appendix has many tables relating to the public lands, wages, rent, prices, and rainfall. The treatment of the whole subject is conservative, without puffery or a display of any glittering inducement to the immigrant.

The Yellowstone National Park. By Capt. Hiram M. Chittenden, C.E., U. S. A. Illustrated with historical chart, 2 maps and 32 views. 355 pp. and index. Fourth Edition. The Robert Clarke Co., Cincinnati, 1903. (*Price, $1.50.*)

The earlier editions of this book had already established its high rank as an historical and descriptive account of our great national playground. In the present edition the book has been enlarged and thoroughly revised. The historical section contains much new material on the early history of the park, including a new account of the exciting episodes of the Nez Percé campaign of 1877. The latest work and studies have also supplied much new material for

the chapters on topography, geology, thermal springs, fauna and flora, roadways, and administration; and the new sections that have been opened in the road system, now practically completed, necessitated many changes and additions in the eight chapters devoted to the Tour of the Park. The book is now a history, guide, and description relating to all phases of the park in its present condition. The key to the map enables the reader to find readily any name on the sheet.

The author says that the original designation of the river that has given its name to the park was *Mi tsi a da zi*, from the Minnetaree, one of the Siouan family of languages, meaning Rock Yellow River. This became, in the French tongue, Roche Jaune and Pierre Jaune; in English, Yellow Rock and Yellow Stone; and usage has now established the form Yellowstone.

Through Canada in Harvest Time. By James Lumsden. xix and 363 pp. 79 half-tone illustrations and a map. T. Fisher Unwin, London, 1903.

A temperate description of the journey made across Canada by a party of British journalists, who received from official and private sources unusual facilities for studying the country and acquiring much accurate information. The visit was made during the harvest of 1902, and the chief end of the book is to give an account of the remarkable recent development of western Canada, and describe with a certain amount of judicious conservatism the attractions that Canada holds out to emigrants from the British Isles. We have as yet so little literature dealing with the prairie regions of Canada that these vivid descriptions of the peopling of the prairies and the opening of the wheat fields and ranches will have for many, even in this country, a novel interest.

Mr. Lumsden quotes from Mr. McKellar, Deputy Minister of Agriculture for Manitoba, estimating the total area of Manitoba, Assiniboia, Saskatchewan, and Alberta at 230,823,000 acres. Deducting forests, mountains, swamps, arid districts, and road allowances, he estimates the amount of desirable farm land at 75,000,000 acres; of this acreage about 30,000,000 acres have passed out of the hands of the Dominion Government and the railroad companies as homesteads or by sale, leaving about 45,000,000 acres of good farming land yet to be disposed of.

Along the Andes. By A. Petrocokino. viii and 144 pp. 74 half-tone illustrations and two sketch maps. Gay & Bird, London, 1903.

The writer's travels led him across Peru, Bolivia, and Ecuador.

His book contains little of fresh geographical interest, but it is a well-written narrative, hitting off many of the characteristics of countries and peoples. All the illustrations are original and many of striking interest, and his route from Quito down the eastern slopes of the Andes, canoeing on the Napo 650 miles to the Amazon, was decidedly off the beaten ways. He made this short cut to take a steamer at Iquitos for Pará, nearly 2,000 miles away. He says that the so-called impenetrable forest on the east slopes of the Andes has its white residents, and nearly every tributary of the Amazon has its settlers, engaged in various trades. Few, if any, of the navigable rivers are not visited by trading launches, so an overland journey from Quito to Pará is not a very formidable undertaking.

Pioneer Spaniards in North America. By William Henry Johnson. xvi and 381 pp. 39 illustrations, an index, with list of reference books. Little, Brown & Co., Boston, 1903.

The author sketches with necessary brevity the romantic and the tragical adventures of the Spanish pioneers in our continent, telling their story in the light of the most recent investigations. None of the leading figures in those early days of American exploration and gold-seeking is missing from these pages. The history thus recounted is true, according to our best light, and the interest of the narration does not flag. It should be a fascinating book for boys and for all adults who wish to read an account, at once accurate and short, of those stirring times and of the part the Spaniards had in opening the continent. Mr. Johnson reminds the reader that though many instances of savage cruelty are recorded in his book, these were the acts of individual Spaniards and that "the aim of the Spanish Government was to treat the Indians kindly, and, in the main, it was faithfully carried out." An appendix is given to the story of ancient Mexico and of the social and religious life of its people.

GUIDE BOOKS.

Central Italy and Rome. Fourteenth Revised Edition. 470 pp. 14 maps, 49 plans, a panorama of Rome, a view of the Forum Romanum, a list of artists and an index. Karl Baedeker, Leipzig, 1904. Price, 7 marks 50 pf. Presented by the Editor.

The Eastern Alps, including the Bavarian Highlands, Tyrol, Salzburg, Upper and Lower Austria, Syria, Carinthia, and Carniola.

Tenth Revised Edition. 571 pp., 53 maps, 10 plans, 7 panoramas and index. Karl Baedeker, Leipzig, 1903. Price, 10 marks. Presented by the Editor.

Norway, Sweden, and Denmark. Eighth revised and augmented edition. 486 pp., 37 maps, 22 plans, 3 panoramas, and index and a sketch of Norwegian and Swedish grammar, with vocabulary and list of phrases. Karl Baedeker, Leipzig, 1903. Price, 8 marks. Presented by the Editor.

These are new editions of Baedeker's Standard Handbooks for travellers. In the English editions heights are given in feet and distances in English miles. All travellers know that the Baedeker guide-books may be consulted with convenience and comfort, that it is a pleasure to consult the maps, which are accurately and artistically drawn, that scarcely anything worth a tourist's notice escapes the attention of the editor, and that a hotel recommended in these books rarely fails to be comfortable and fair in price. Revision is especially evident in the volume on Norway, Sweden, and Denmark. Norway in particular is growing in popularity with tourists, and is opening not a few new travel routes and hotels.

North Devon and North Cornwall from Exmoor to the Scilly Isles. Eighth revised edition. By C. S. Ward. 160 pp. 21 maps and plans by Bartholomew, and an index. By Dulau & Co., London, 1903.

The pleasure resorts of these counties are chiefly along their coasts, which embrace a great diversity of scenery and offer large variety in the way of amusement. The result is that the number of visitors has enormously increased in recent years, and from Penzance to Exeter there is much to suit a variety of tastes and purses. The guide-book is intended for those who visit this part of the British coast. Much attention is given to rambles and walks, which are the best way of seeing a considerable part of the country; and the questions where to go and what to do are fully answered. The admirable maps are coloured to show elevations above the sea, and sufficiently large in scale to show all the hamlets and cross roads, as well as the more essential data.

TRANSACTIONS OF THE SOCIETY.

A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, April 19, 1904, at 8.30 o'clock P.M. Vice-President Moore in the chair.

The following persons, recommended by the Council, were elected Fellows:

Edward H. Kidder. Richard H. Allen.

The Chairman then introduced Dr. Edmund O. Hovey, who addressed the Society on the incidents of a Journey in Southern Russia and the Caucasus Mountains.

Maps and views were shown. On motion, the Society adjourned.

NOTES AND NEWS.

THE CULLUM GEOGRAPHICAL MEDAL has been awarded by the Council to Sven Hedin for his explorations and discoveries in Central Asia; Lob-nor, the Desert of Gobi, the Kwen-lun Mountains and Tibet.

EIGHTH INTERNATIONAL GEOGRAPHIC CONGRESS.—The proposed meeting of the Congress for one day, in Baltimore, has been abandoned on account of the recent great fire.

POPULATION OF THE UNITED STATES.—The Department of Commerce and Labor, Bureau of the Census, published on the 5th of April a Bulletin (No. 7) presenting estimates of the population of the United States for 1901, 1902, and 1903.

The total for 1903 (exclusive of Alaska and the insular possessions) is 79,900,389.

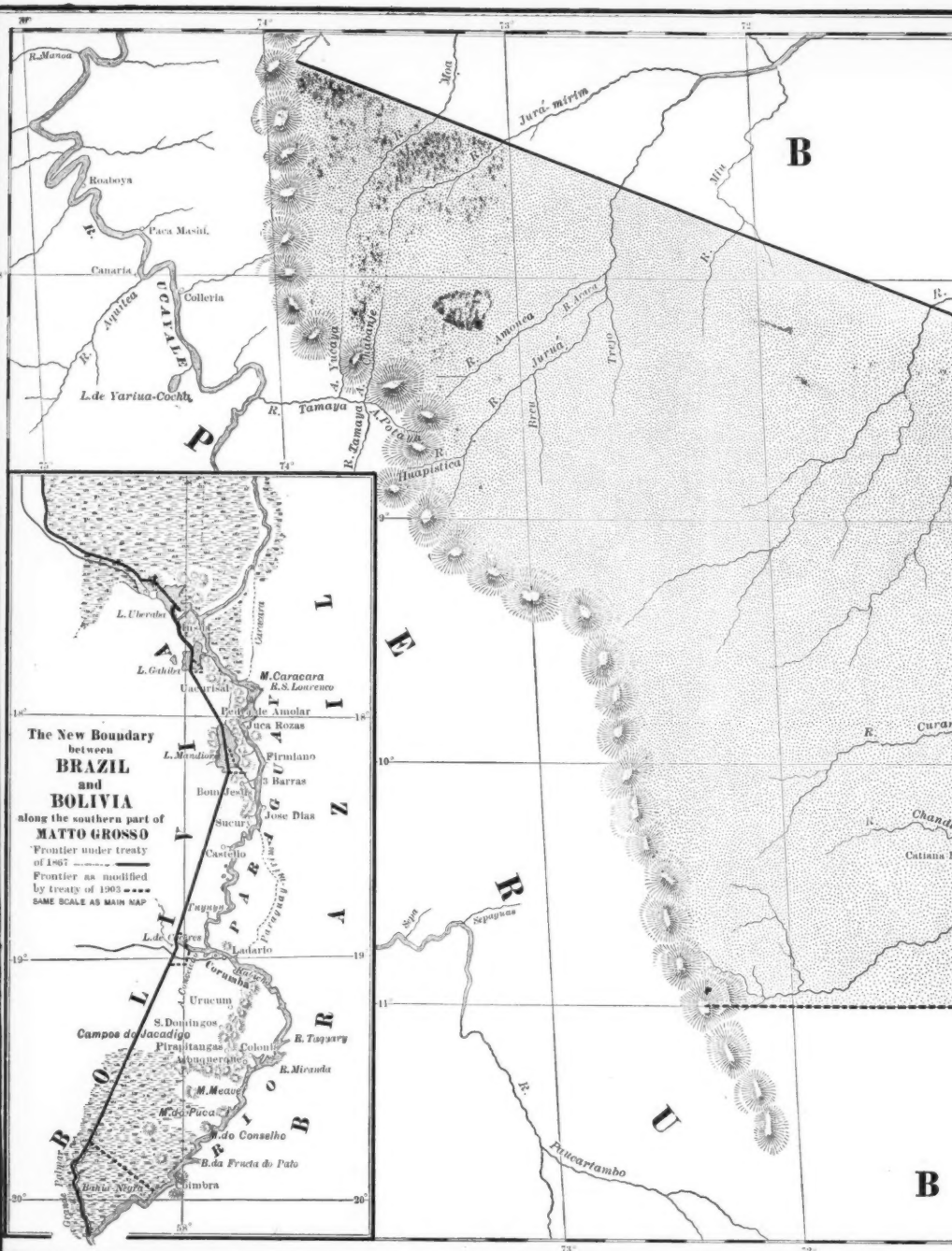
There are 438 cities with a population of 10,000, or more.

The following list gives the figures for the States and Territories, with the largest city in each:

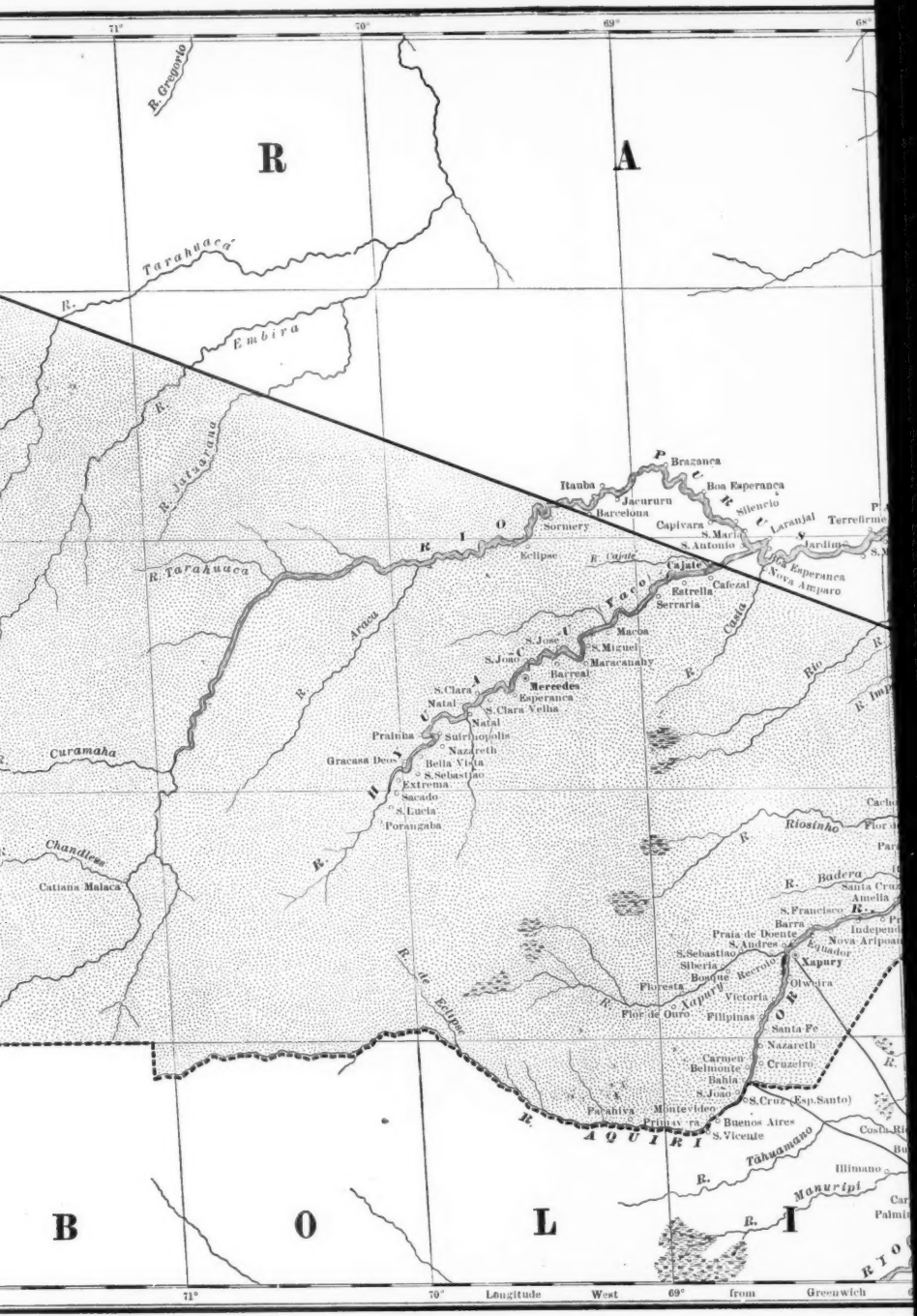
Alabama.....	1,923,284;	Birmingham.....	42,087
Arizona.....	133,338;	no city of.....	10,000
Arkansas	1,366,119;	Little Rock.....	42,036
California.....	1,564,286;	San Francisco.....	355,919
Colorado.....	574,030;	Denver.....	144,588
Connecticut.....	956,789;	New Haven.....	114,600
Delaware	189,878;	Wilmington	81,300
District of Columbia..	293,217;	Washington.....	293,217

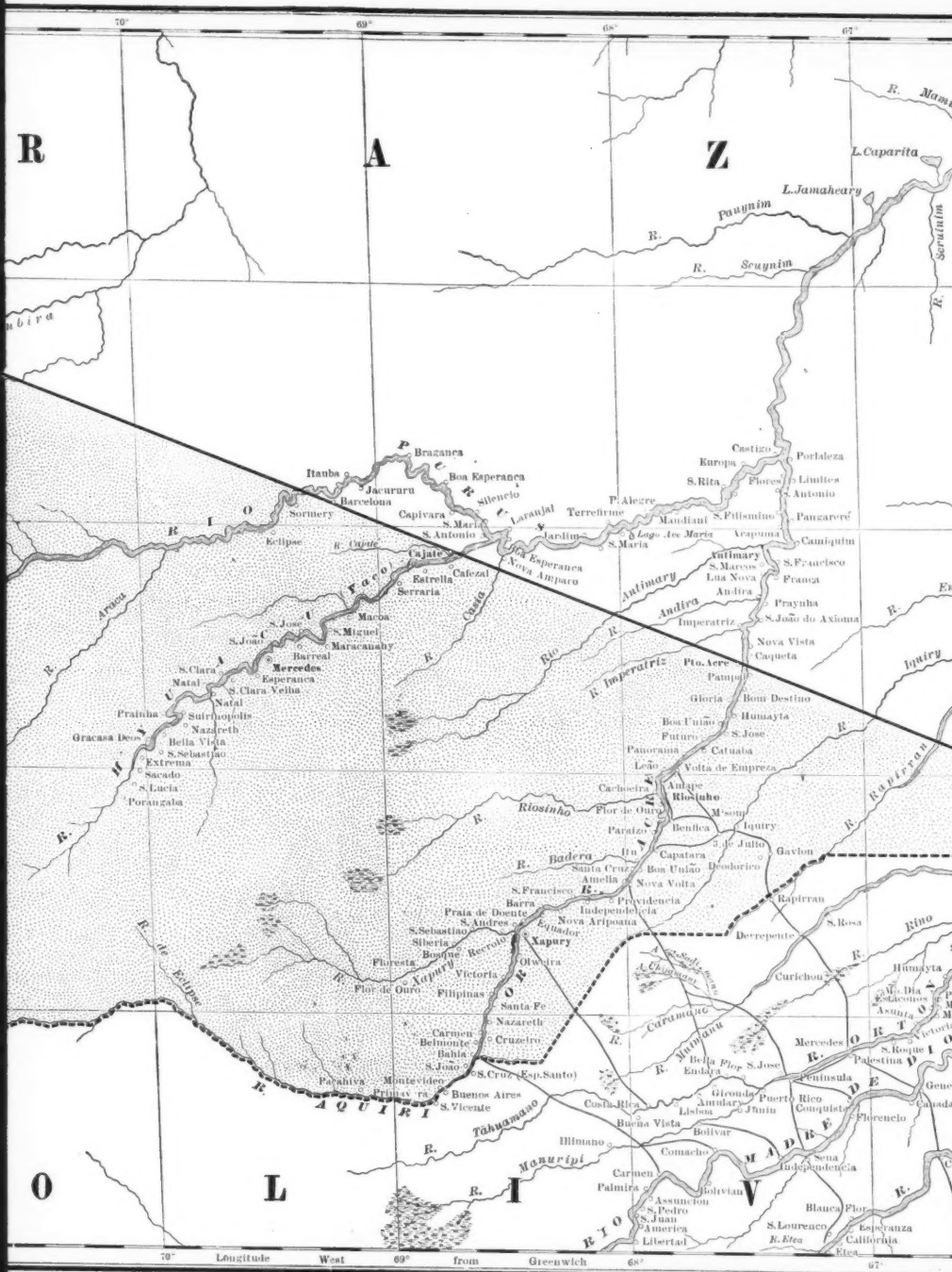
Florida	566,885;	Jacksonville	31,798
Georgia	2,336,404;	Atlanta	96,550
Idaho	183,738;	no city of	10,000
Illinois	5,117,036;	Chicago	1,873,880
Indian Territory	455,624;	no city of	10,000
Indiana	2,614,223;	Indianapolis	191,033
Iowa	2,336,484;	Des Moines	65,754
Kansas	1,469,969;	Kansas City	55,348
Kentucky	2,230,619;	Louisville	215,402
Louisiana	1,460,237;	New Orleans	300,615
Maine	702,875;	Portland	52,656
Maryland	1,231,739;	Baltimore	531,313
Massachusetts	2,974,021;	Boston	594,618
Michigan	2,510,647;	Detroit	309,653
Minnesota	1,857,462;	Minneapolis	214,111
Mississippi	1,629,771;	Vicksburg	15,271
Missouri	3,227,214;	St. Louis	612,279
Montana	277,102;	Butte	36,127
Nebraska	1,098,139;	Omaha	15,680
Nevada	40,829;	no city of	10,000
New Hampshire	422,109;	~~Concord~~ Manchester	~~42,478~~ 61
New Jersey	2,016,797;	Newark	265,394
New Mexico	205,819;	no city of	10,000
New York	7,659,814;	New York	3,716,139
North Carolina	1,976,571;	Wilmington	21,252
North Dakota	357,594;	no city of	10,000
Ohio	4,302,860;	Cleveland	414,950
Oklahoma	495,285;	Oklahoma City	12,800
Oregon	437,302;	Portland	98,655
Pennsylvania	6,606,747;	Philadelphia	1,367,716
Rhode Island	454,629;	Providence	189,741
South Carolina	1,397,067;	Charleston	56,061
South Dakota	443,927;	Sioux Falls	10,293
Tennessee	2,095,223;	Memphis	113,669
Texas	3,285,474;	San Antonio	58,016
Utah	295,404;	Salt Lake City	57,138
Vermont	347,007;	Burlington	19,855
Virginia	1,919,103;	Richmond	86,148
Washington	581,626;	Seattle	92,020
West Virginia	1,021,106;	Wheeling	40,186
Wisconsin	2,155,441;	Milwaukee	312,736
Wyoming	101,525;	Cheyenne	14,807

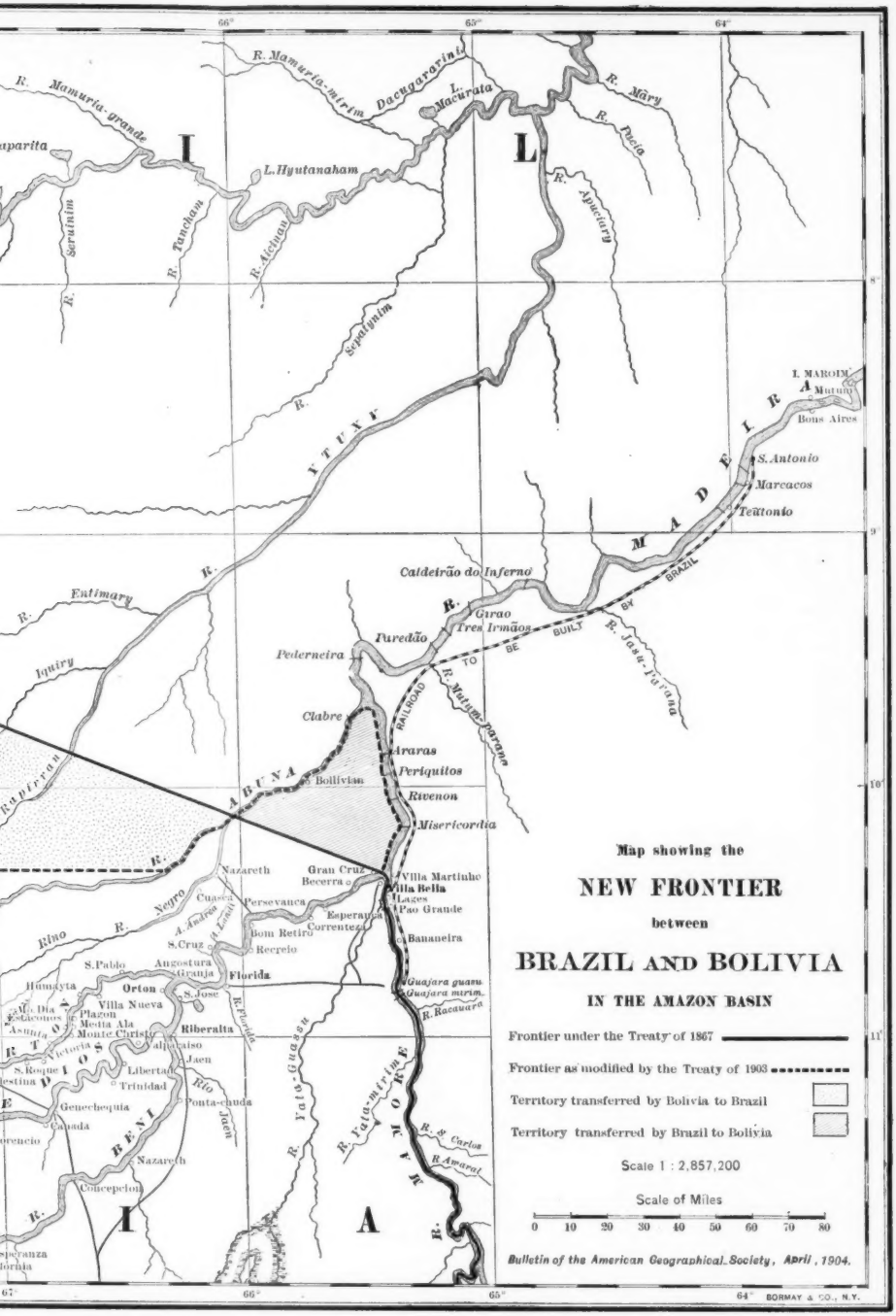
XUM


The New Boundary
between
BRAZIL
and
BOLIVIA
along the southern part of
MATTO GROSSO
Frontier under treaty of 1867
Frontier as modified by treaty of 1903
SAME SCALE AS MAIN MAP
R. Manoa
Roaboya
Paca Masini
Canaria
Colleria
L. de Yariua-Cochi
R. Tamaya
R. Huapistica
R. Amonea
R. Jurua
R. Purus
R. Curan
R. Chand
Catiana
R. Sepa
Sepaykas
R. Paucartambo
Jura-mirim
Mon
Yuca
Tuiuiu
Caravara
L. Uberaba
L. Gahiba
M. Caracara
R. S. Lourenco
Pedra de Amolar
Juca Rozas
L. Mandioré
Firmiano
3 Barras
Bom Jesus
Sucuri
Jose Dias
Castello
Tuyuyu
L. de Cáceres
Ladario
Urucum
S. Domingos
Campos de Jacadigo
Pirahitangas
Colonia
R. Tacuary
Aquidauana
R. Miranda
M. Meaue
M. Puca
M. do Conselho
B. da Fructa do Pato
Bahia Negra
Cimbra
BOLIVIA
BRAZIL
PERU
B

XUM


R
A
B
O
L
I
R. Gregorio
Tarahuacá
Embira
R. Jutahyranha
R. Tarahuaca
Curamaha
Chandless
Catiana Malaca
Arauca
Purus
Yaco
Acre
Rio
Bragança
Itauba
Boa Esperança
Jacururu
Barcelona
Sormery
Capivara
Laranjal
Terrafirme
S. Antonio
Jardim
Eclipse
Cajate
Nova Esperança
Nova Amparo
Estrella
Cafezal
Serraria
Costa
Macos
S. Jose
S. Miguel
S. Joao
Maracanahy
Barreal
Mercedes
Esperança
S. Clara
Natal
S. Clara Velha
Prainha
Sutrihopolis
Nazareth
Gracasa Deos
Bella Vista
S. Sebastião
Extrema
Sacado
S. Lucia
Porangaba
Riosinho
Badera
Santa Cruz
Amelia
S. Francisco
Barra
Praia de Docente
Independencia
Nova Aripoana
S. Andres
Ecuador
S. Sebastião
Xapury
Siberia
Recreio
Bosque
Floresta
Victoria
Oliveira
Flor de Ouro
Filipinas
Santa Fe
Nazareth
Carmen
Belmonte
Cruzeiro
Bahia
S. Joao
S. Cruz (Esp. Santo)
Parahiva
Montevideo
Primavera
Buenos Aires
S. Vicente
Aquiri
Tahuamano
Manuripi
Ilimano
Palmira
Rio
71°
70°
69°
68°
Longitude West from Greenwich


R A Z
O L I V
R. Mamoria
L. Caparita
L. Jamaheary
Pauynim
R. Seuynim
R. Seruinim
Bonfim
Brazanca
Boa Esperanca
Itauba
Jacururu
Barcellona
Sormery
Eclipse
Capivara
S. Maria
S. Antonio
Laranjal
Terrefirme
P. Alegre
Jardim
S. Maria
Lago Aec Maria
Mandiani
S. Filismino
Araquma
Castizo
Europa
S. Rita
Portaleza
Flores
Limites
Antonio
Panzareré
Camiquim
Antimary
S. Francisco
Franca
Andira
Prayuba
S. João do Axioma
Imperatriz
Nova Vista
Caqueta
Pto. Acre
Pampa
Gloria
Bom Destino
Humayta
S. Jose
Catuaba
Volta de Empreza
Riosinho
Flor de Ouro
Paraizo
Benfica
Iquiry
Gavion
Rapirran
Rio Yuma
Rio Purus
Rio Iquiry
Rio Imperatriz
Rio Andira
Rio Castanho
Rio Riosinho
Rio Badera
Rio Rapirran
Rio Caramuré
Rio Manoel Dias
Rio Manicoré
Rio Tahuamano
Rio Manuripi
Rio Madre de Dios
Rio Beni
Rio Mamoré
Rio Aquiri
Rio Xapury
Rio de Eclipse
Rio Acre
Rio Abuna
Rio Orton
Rio Yaco
Rio Araca
Rio Purus
Rio Iquiry
Rio Rapirran



Map showing the

NEW FRONTIER

between

BRAZIL AND BOLIVIA

IN THE AMAZON BASIN

Frontier under the Treaty of 1867 ——————

Frontier as modified by the Treaty of 1903 - - - - - - -

Territory transferred by Bolivia to Brazil

Territory transferred by Brazil to Bolivia

Scale 1 : 2,857,200

Scale of Miles

0 10 20 30 40 50 60 70 80

Bulletin of the American Geographical Society, April, 1904.

BORMAY & CO., N.Y.